ETXexpress-MC User's Guide

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Kontron reserves the right to make changes without notice in product or component design as warranted by evolution in user needs or progress in engineering or manufacturing technology. Changes which affect the operation of the unit will be documented in the next revision of this user's guide.

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1. User Information

About This Manual

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Trademarks

The following lists the trademarks of components used in this board.

- Microsoft is a registered trademark of Microsoft Corp.
- Intel is a registered trademark of Intel Corp.
- All other products and trademarks mentioned in this manual are trademarks of their respective owners.

Standards

Kontron America is certified to AS 9100 quality management standards.

Advisory Conventions

Four types of advisories are used throughout this user's guide to provide helpful information or to alert you to the potential for hardware damage or personal injury. They are Notes, Cautions, and Warnings. The following is an example of each type of advisory. Use caution when servicing any electrical component

Note: A note is used to make helpful information stand out.

Important: An important note indicates information that is important for you to know.

CAUTION

A CAUTION indicates potential damage to hardware and tells you how to avoid the problem.

WARNING

A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

Disclaimer: We have tried to identify all situations that may pose a warning or caution condition in this user's guide. However, Kontron does not claim to have covered all situations that might require the use of a Caution or Warning.

Guarantee and Warranty Policy

Guarantee

A thirty day money-back guarantee is provided on all standard products sold. Special order products are covered by our Limited Warranty, however they may not be returned for refund or credit. EPROMs, RAM, Flash EPROMs or other forms of solid electronic media are not returnable for credit - but for replacement only. An extended warranty is available. Consult the factory.

Refunds

In order to receive a refund on a product for the purchase price, the product must not have been damaged by the customer or by the common carrier chosen by the customer to return the goods and the product must be returned complete (meaning all user's guides, software, cables, etc.) within 30 days of receipt and in an as-new and resalable condition. The "Return Procedure" must be followed to assure a prompt refund.

Restocking Charges

Product returned after 30 days, and before 60 days, of the purchase will be subject to a minimum 20% restocking charge and charges for any damaged or missing parts. Products not returned within 60 days of purchase, or products which are not in an as-new and resalable condition, are not eligible for a credit return and will be returned to the customer.

Limited Warranty

Effective April 1, 1998, all products carry a 2-year limited warranty. Within 2 years of purchase, Kontron will repair or replace, at our option, any defective product. Kontron will service the warranty for all standard catalog products for the first two years from the date of shipment. Please note: The 2-year warranty may not apply to special promotion items. Please consult the factory for warranty verification.

The limited warranty is void if the product has been subjected to alteration, neglect, misuse, or abuse; if any repairs have been attempted by anyone other than Kontron or its authorized agent; or if the failure is caused by accident, acts of God, or other causes beyond the control of Kontron or the manufacturer. Neglect, misuse, and abuse shall include any installation, operation, or maintenance of the product other than in accordance with the user's guide.

No agent, dealer, distributor, service company, or other party is authorized to change, modify, or extend the terms of this Limited Warranty in any manner whatsoever. Kontron reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.

Return Procedure

For any Guarantee or Limited Warranty return, please contact Kontron Customer Service at 800-480-0044 or 858-677-0877 and obtain a Return Material Authorization (RMA) Number. All product(s) returned to Kontron for service or credit must be accompanied by a Return Material Authorization (RMA) Number. Freight on all returned items must be prepaid by the customer who is responsible for any loss or damage caused by common carrier in transit. Returns for Warranty must include a Failure Report for each unit, by serial number(s), as well as a copy of the original invoice showing the date of purchase.

To reduce risk of damage, returns of product must be in a Kontron shipping container. If the original container has been lost or damaged, new shipping containers may be obtained from Kontron Customer Service at a nominal cost.

Kontron owns all parts removed from repaired products. Kontron uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Kontron repairs or replaces a product, its warranty term is not extended.

Kontron will normally return your replacement or repaired items via ground. Overnight delivery or delivery via other carriers is available at an additional charge.

Shipments not in compliance with this Guarantee and Limited Warranty Return Policy will not be accepted by Kontron.

Limitation of Liability

In no event shall Kontron be liable for any defect in hardware, software, loss, or inadequacy of data of any kind, or for any direct, indirect, incidental, or consequential damages in connection with or arising out of the performance or use of any product furnished hereunder. Kontron's liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Kontron or its authorized agent.

Some sales items and customized systems are not subject to the guarantee and limited warranty. However in these instances, any deviations will be disclosed prior to sales and noted in the original invoice. **Kontron reserves the right to refuse returns or credits on software or special order items.**

Technical Support

Technicians and engineers from Kontron Embedded Modules and/or its subsidiaries and official distributors are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Before contacting Kontron Embedded Modules technical support, please contact your local representative or consult our Web site for the latest product documentation, utilities, and drivers. If the information does not help to solve the problem, contact us by telephone or email.

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2. Getting Started

Before You Begin

Before handling your ETXexpress-MC, read the instructions and safety guidelines on the following pages to prevent damage to the product and to ensure your own personal safety.

- Always use caution when handling or operating a computer. Only qualified, experienced, authorized electronics service personnel should access the interior of a computer. The power supplies produce high voltages and energy hazards, which can cause bodily harm.
- If you have any problems or questions about the unit, please contact Kontron Post-Sales Technical Support.

WARNING

High voltages are present inside a computer chassis when the unit's power cord is plugged into an electrical outlet. Turn off system power, turn off the power supply, and then disconnect the power cord from its source before removing the chassis cover. Turning off the system power switch does not remove power to components.

Unpacking

When unpacking, follow these steps:

1) After opening the box, save it and the packing material for possible future shipment.
2) Remove all items from the box. If any items listed on the purchase order are missing, notify Kontron customer service immediately.
3) Inspect the product for damage. If there is damage, notify Kontron customer service immediately. Refer to "Guarantee and Warranty Policy" for the return procedure.

When Working Inside a Computer

Before taking covers off a computer, perform the following steps:

1) Turn off the computer and any peripherals.
2) Disconnect the computer and peripherals from their power sources or subsystems to prevent electric shock or system board damage. This does not apply when hot swapping parts.
3) Follow the guidelines provided in “Preventing Electrostatic Discharge” in the following section.
4) Disconnect any telephone or telecommunications lines from the computer.

In addition, take note of these safety guidelines when appropriate:

- To help avoid possible damage to system boards, wait five seconds after turning off the computer before removing a component, removing a system board, or disconnecting a peripheral device from the computer.
- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs. If you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before connecting a cable, make sure both connectors are correctly oriented and aligned

Preventing Electrostatic Discharge

Static electricity can harm system boards. Perform service at an ESD workstation and follow proper ESD procedure to reduce the risk of damage to components. Kontron strongly encourages you to follow proper ESD procedure, which can include wrist straps and smocks, when servicing equipment.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component’s antistatic packing material until you are ready to install the component in a computer. Just before unwrapping the antistatic packaging, be sure you are at an ESD workstation or grounded. This will discharge any static electricity that may have built up in your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components at an ESD workstation. If possible, use antistatic floor pads and workbench pads.

- Handle components and boards with care. Don’t touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.
- Do not handle or store system boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

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3. Introduction

ETXexpress-MC

Built around the Intel® Core™ 2 Duo processor (4MB L2, 800FSB) and Intel® 965GM chipset, the ETXexpress-MC is a robust and power efficient computer-on-module. The ETXexpress-MC offers support for GEN4 graphics to meet the requirements of embedded applications that require advanced video capabilities. It is one of the first COM Express pin-out type 2 compliant modules to support dual-channel memory up to 4GB via two DDR2 SO-DIMM sockets positioned on the top side of the module. This module has 5x PCI Express x1 lanes, 3x SerialATA ports, and 8x USB 2.0 ports along with Gigabit Ethernet. Onboard TPM 1.2 allows the ETXexpress-MC to be used in power and thermal sensitive designs.

All Kontron ETXexpress COMs provide PCI Express, PCI 32, SUB and SerialATA in the same physical positions on each module. This guarantees scalability between modules. They also feature an Advanced Configuration and Power Interface (ACPI) for optimized power management and are fully compliant with the PCI Industrial Computer Manufacturer‘s Group (PICMG) COM Express Specification.

ETXexpress Specification Overview

The international COM Express™ Specification defines two new form factor sizes:

- Basic (95mm x 125mm) Module
- Extended (110mm x 155mm) Module

The primary difference between the Basic and Extended Modules is that Extended Modules have a larger board size and a thermal envelope.

Five Module Pin-out Types (1-5) exist for Basic and Extended modules, each offering different functionalities. For a complete explanation of the features, pin-outs and signals of each of the Module Pin-out Types 1-5, please see the COM Express™ Specification. The COM Express™ Specification is available on the PICMG (PCI Industrial Computer Manufacturers Group) Web site: www.picmg.org. There is a fee for the document. All Kontron ETXexpress Modules are based upon the COM Express™ Specification, which Kontron played the lead role in developing.

The ETXexpress-MC uses the Pin-out Type 2 architecture, which includes PCI and IDE interfaces. These modules either use onboard graphics capabilities or may use 16 PCI Express Graphics (PEG) lanes to connect to an external video controller. For graphics, PEG pins may be alternatively used for two SDVO ports.

Module Pin-out Type 2 features include:

- Dual 220 pin connectors (Rows A-B and Rows C-D, 440 pins total)
- 32-bit PCI interface
- IDE port (to support legacy ATA devices such as CD-ROM drives and Compact Flash storage cards)
- Up to 22 PCI Express lanes (up to 6 on Rows A-B and up to 16 on Rows C-D)
- 16 of 22 PCI Express lanes commonly used for PEG (PCI Express Graphics)
- SDVO option in which pins are shared with PEG (PCI Express Graphics)
- Maximum module input power capability extended to 188W
- Up to 8 USB 2.0 ports; 4 shared over-current lines; USB 1.1 compatible
- Up to 2 Serial ATA or SAS (Serial Attached SCSI) ports
- Up to 6 PCI Express lanes
- Up to 2 Express Cards
- Dual 24-bit LVDS channels
- Analog VGA and TV Out: Composite Video, S-Video, Component Video (YPbPr)
- Intel High Definition Audio (Azalia) and legacy AC '97 digital audio interface (external CODEC)
- Single Ethernet interface (10 /100 megabits per second) with integrated PHY. This feature is pinned for Gigabit Ethernet.
- 120W maximum input power over module connector pins
- +12V primary power supply input, +5V standby and 3.3V RTC power supplies

Understanding ETXexpress Functionality

An ETXexpress COM contains two mounting connectors, each of which has two rows. The primary connector holds Row A and Row B. The secondary connector holds Row C and D.

The primary connector (Rows A and B) features the following functionality:

- Ethernet
- SATA
- USB 2.0
- LVDS/VGA video
- High-definition audio

- LPC, an Intel proprietary low-pin count (LPC), which supports low-speed devices such as RS-232 serial and parallel ports.

The secondary connector (Rows C and D) provides support for the following buses and I/O:

- PCI Express
- PCI
- IDE

ETXexpress Reference Documents

This User Guide serves as one of three principal references for an ETXexpress COM design. The other two references include:

- The *Com Express™ Specification*, which defines the two COM Express™ form factors (Basic and Extended), the five module types, pin-outs, and signals. You should read this document first. You can find the COM Express™ Specification on the PICMG (PCI Industrial Computer Manufacturers Group) Web site: www.picmg.org. There is a fee for the document. All Kontron ETXexpress Modules are based upon the COM Express™ Specification. Kontron played a leading role in developing the COM Express™ Specification.
- The *ETXexpress Design Guide* serves as a general guide for carrier board design, with a focus on maximum flexibility to accommodate a range of ETXexpress modules.

About PCI Express

PCI Express has become the primary data path for upcoming x86 based systems. Non PCI Express components such as PCI plug-in cards can still be supported with the PCI 2.1 32-bit interface. ETXexpress COMs will continue supporting the PCI bus for legacy applications.

PCI Express is an international I/O interconnect bus standard that expands on and doubles the data transfer rates of the original PCI bus standard. PCI Express is a two-way, serial connection that carries data in packets along two pairs of point-to-point data lanes, compared to the single parallel data bus of traditional PCI that routes data at a set rate.

Initial bit rates for PCI Express reach 2.5Gb/s per lane direction, which equate to data transfer rates of approximately 200MB/s. A group of companies, headed by Kontron, developed the COM Express™ Specification so that high-speed interconnects such as 1394b (Firewire), USB 2.0, InfiniBand and Gigabit Ethernet would have an I/O architecture suitable for their high transfer speeds.

Thermal Management

Heat-spreader

The heat-spreader is ???

Higher-power modules or higher-temperature conditions probably require heat-removal devices such as a heat sink and fan, heat pipe, a larger heat sink attached to the heat-spreader, or it may need to be thermally-coupled to a chassis.

Photos

[Note: updated photo needed]

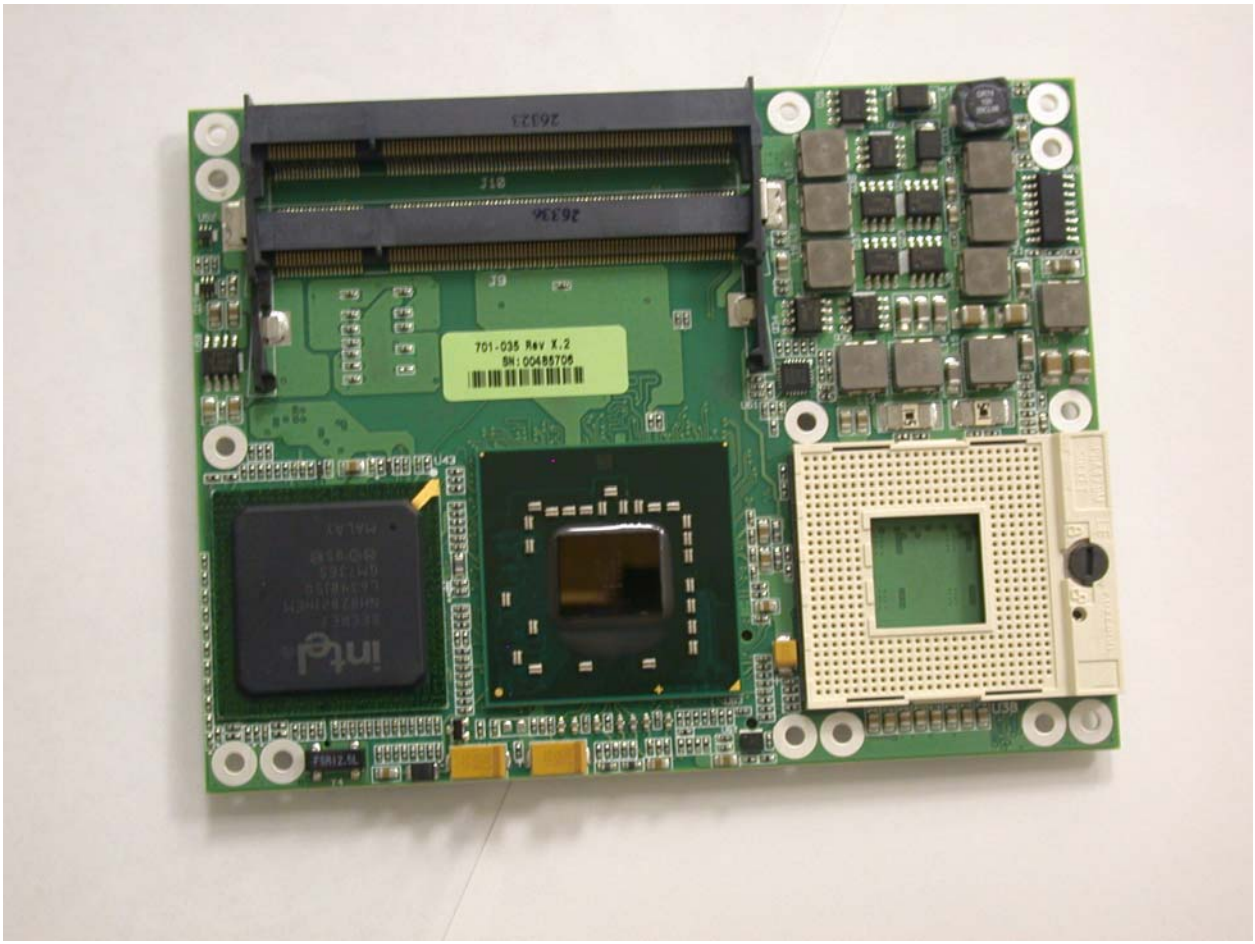
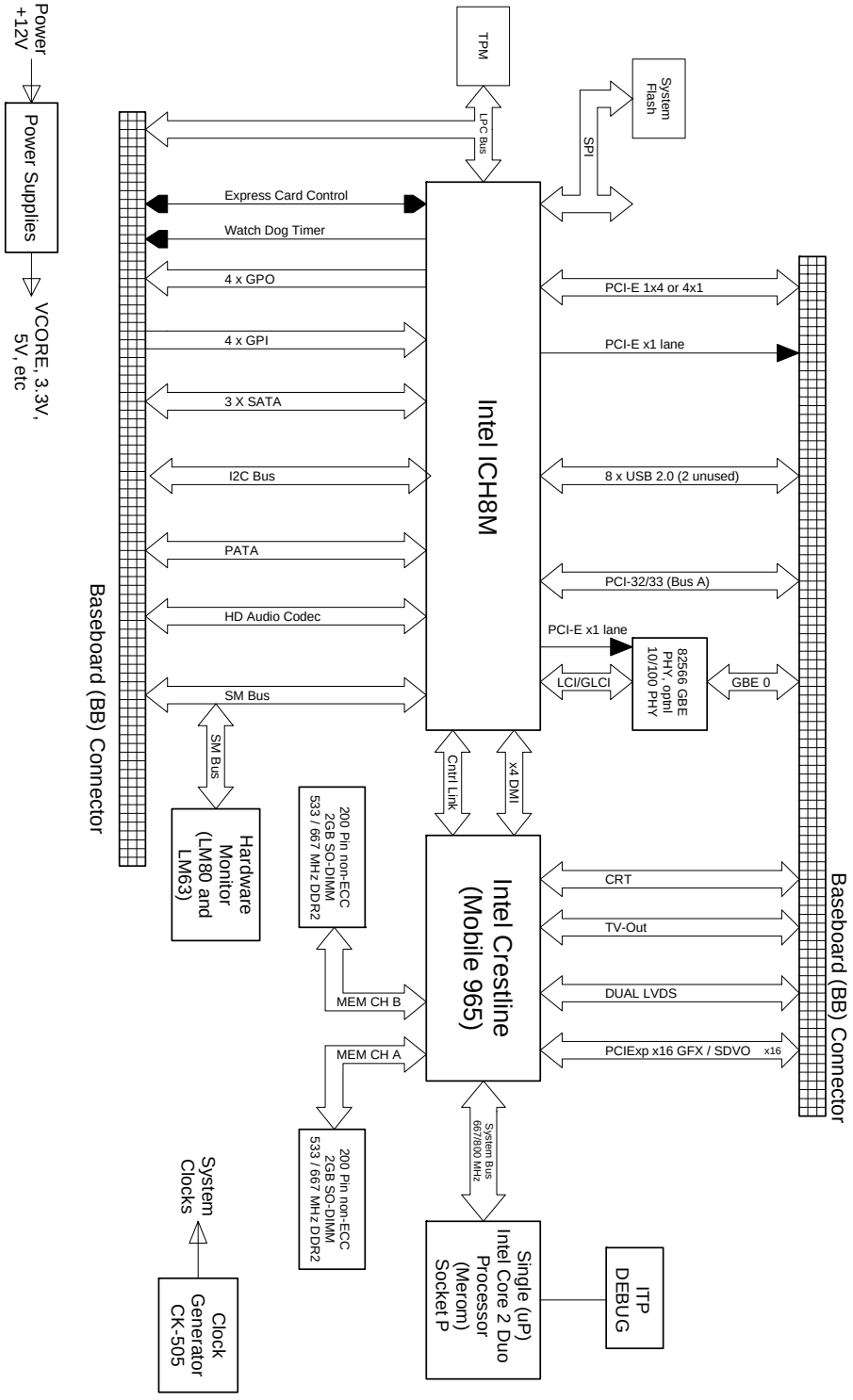


Figure 1: ETXexpress-MC

Block Diagram



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4. Specifications

Functional Specifications

Processors

- Intel® Core™ Duo processors up to 2.2GHz,
- Intel® Core™ Solo (Celeron) processors up to TBD GHz

Buses

- 533/800MHz FSB

Chipset

- Mobile Intel® 965GM Express chipset

Hard Disk

- 3x Serial ATA (Type I); RAID support per ICH8M Enhanced capabilities
- 1x Parallel ATA

Cache

- Up to 4MB L2

Memory

- Up to 4GB (2x 2048MB) DDR2 SO-DIMM (2x 200-pin)

USB 2.0

- 8x USB 2.0 Ports for external peripherals; supports USB 2.0

PCI Express

- 5x PCI Express x1 lanes

PCI 32

- PCI 2.1, 32 bit/33MHz

Ethernet

- 1x Gigagit Ethernet (Intel® 82566DM)

Sound

- AC ‘97 and Intel High Definition Audio

Video Controller

- Integrated in Intel 965GM chipset with Intel GMA X3000 graphics technology
- plus PCI Express Graphics 1 x16 lanes / Dual SDVO

BIOS

- AMI

CRT and LVDS Resolution

- CRT up to 2048 x 1536,
- LVDS up to UXGA (1600 x 1200) JILI/ EDID support

LCD Panel Support

- Single and Dual Channel LVDS

TV Out / HDTV Resolution

- TV output. Component, S-Video or composite HDTV Support (480p/720p/1080i/1080p)

Other Features

- LPC
- JIDA Support
- IrDA enhanced
- WakeOnLAN
- Watchdog
- I^2C Bus
- Real-Time Clock
- E^2PROM BIOS Setup
- LAN Boot
- JRC support
- Suspend states (S0/S3/S4/S5)

Mechanical Specifications

Dimensions

- 95.0 mm x 125.0 mm
- Height approx. 12 mm (0.4”) ???

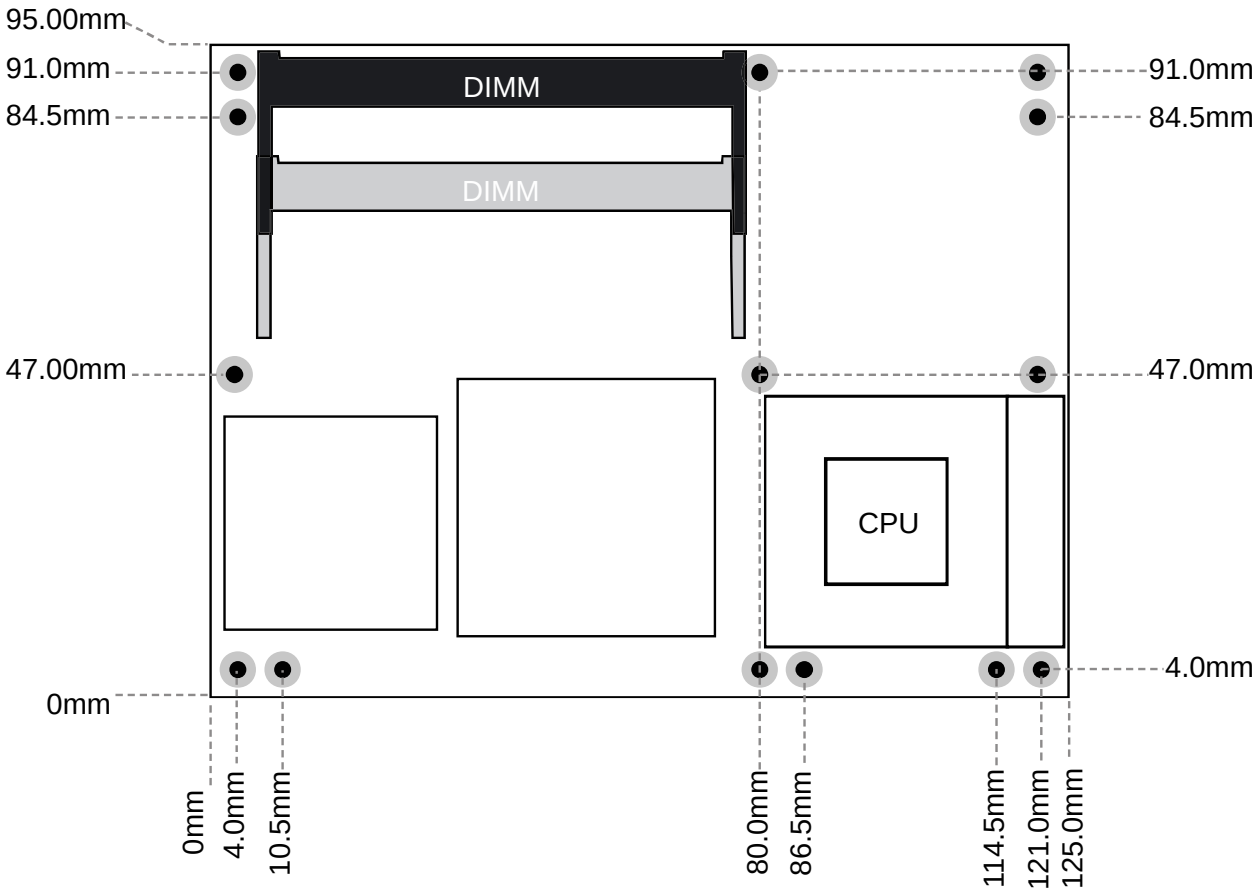

Figure 2: Dimensions

Views with Socketed Processor

Figure 3: Side View with Socketed Processor

Figure 4: 2nd Side View with Socketed Processor

Views with BGA Processor

Figure 5: Side View with BGA Processor

Figure 6: 2nd Side View with BGA Processor

Views with Heat Spreader

Figure 7: Side View with Heat Spreader

Figure 8: 2nd Side View with Heat Spreader

Heat Spreader

ETXexpress-MC Accessories (HS & HW required)		
???		

Electrical Specifications

Supply Voltage

- 12V DC +/- 5%
- +5V for standby operation (for ATX mode operation)

Supply Voltage Ripple

- Maximum 100 mV peak to peak 0 – 20 MHz ???

Environmental Specifications

Temperature

- Operating: (with Kontron heat-spreader plate assembly 18023-0000-99-0:

  Ambient temperature: 0° to +60° C

  Maximum heat-spreader-plate temperature: 0° to +60° C (*)

- Non-operating: -10° to +85° C

  Note: *The maximum operating temperature with the heat-spreader plate is the maximum measurable temperature on any spot on the heat-spreader's surface. You must maintain the temperature according to the above specification.

- Operating (without Kontron Embedded Modules heat-spreader plate assembly):

  Maximum operating temperature: 0° to +60° C (**)

- Non operating: -10° to +85° C

  Note: **The maximum operating temperature is the maximum measurable temperature on any spot on a module's surface. You must maintain the temperature according to the above specification.

Humidity

- Operating: 10% to 90% (non condensing)
- Non operating: 5% to 95% (non condensing)

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5. CPU, Memory, Chipset, and Super I/O

For complete information on BIOS setup options (when available), see the BIOS Operation section in the back of this manual.

CPU

The central processing unit (CPU) consists of:

- Intel Core 2 Duo 65 nm process processors
  - BGA and uPGA builds (Intel Socket-P BGA and PGA)
  - FSB speed options of 533 and 800 MHz
  - Supported processors to include:

    2.2 GHz 800 MHz FSB 4MB Cache Std Voltage 35W Dual Core BGA & PGA

    1.6 GHz 800 MHz FSB 4MB Cache Low Voltage 17W Dual Core BGA
- Merom Celeron Single Core 533 MHz FSB 1MB Cache Single Core PGA

Configuration

You can configure support for the CPU from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->CPU Configuration Submenu.

Memory

The ETXexpress-MC handles up to 4GB Double Data Rate memory (DDR2) at 533 and 667MHz in two 200 pin SO-DIMMs. DDR allows data to move on the rising and falling edges of clock cycles in a data burst.

Configuration

Memory does not require configuration.

Chipset

The Mobile Intel® 965GM Express chipset is a component of the Intel® Centrino™ Duo mobile technology. Featuring the Mobile Intel® Graphics Media Accelerator X3100, the 965GM chipset enables 2x the graphics performance of the previous generation of platforms based on the Intel® 855GME chipset. ???

The 965GM chipset supports up to 4GB of DDR2 system memory, which enables a 60% increase in peak memory bandwidth and power benefits over DDR memory. The chipset supports PCI Express bus architecture, a highly scalable general purpose I/O for the latest industry peripherals such as the Express Card.

The Intel 965GM chipset offers the following features and benefits:

Processor Support

- Source synchronous double-pumped (2x) address
- Source synchronous quad-pumped (4x) data
- Intel® Dynamic Front Side Bus Frequency Switching
- Support for DBI (Data Bus Inversion)
- Support for MSI (Message Signaled Interrupt)
- 36-bit interface to addressing, allowing the CPU to access the entire 64 GB of the (G)MCH's memory address space
- 12-deep, in-order queue to pipeline FSB commands
- AGTL+ bus driver with integrated AGTL termination resistors

System Memory Support

- Supports dual channel DDR2 SDRAM
- One SO-DIMM connector (or memory module) per channel
- Two Memory Channel Configurations supported
  - — Dual channel interleaved
  - — Dual channel Asymmetric
- Maximum memory supported: 4 GB
- Intel® Flex Memory Technology support
- 64-bit wide per channel
- Support for DDR2 at 667 MHz and 533 MHz
- 256-Mb, 512-Mb, and 1-Gb memory technologies supported

- Support for x8 and x16 devices
- Support for DDR2 On-Die Termination (ODT)
- Supports partial writes to memory using data mask signals (DM)
- Dynamic rank power-down
- No support for Fast Chip Select mode
- No support for ECC

PCI Express Graphics Attach Port

- One 16-lane (x16) PCI Express port for external PCI Express-based graphics card (May also be configured as a PCI Express x1 port for video capture)
- Lane reversal is supported
- Polarity Inversion is supported

Integrated Graphics

- Mobile Intel® Graphics Media Accelerator X3100 (Mobile Intel® GMA X3100)
- Supports a QXGA maximum resolution of 2048 x 1536 at 60-Hz, 32-bpp reduced blanking timing (driver limited)†
- 500-MHz core render clock at 1.05-V core voltage
- Supports Analog TV-Out, LVDS, Analog CRT and SDVO
- Intel® Smart 2D Display Technology (Intel® S2DDT)
- Video Capture via x1 concurrent PCI Express port
- Dynamic Video Memory Technology (DVMT 4.0; 384 Maximum)
- Intel® Clear Video Technology
  - — MPEG-2 Hardware Acceleration
  - — WMV9 Hardware Acceleration
  - — ProcAmp
  - — Advanced Pixel Adaptive De-interlacing
  - — Sharpness Enhancement
  - — De-noise Filter
  - — High Quality Scaling
  - — Film Mode Detection and Correction
  - — Intel® TV Wizard

- Microsoft DirectX* 9
- Intermediate Z
- OpenGL* 1.5
- HW Pixel Shader 3.0
- HW rotation

Note: †Indicated maximum resolutions may not be supported on all ports or in all dual display configurations

Analog CRT

- Integrated 300-MHz RAMDAC
- Support for CRT hot plug

Dual Channel LVDS

- 25-112 MHz single/dual channel
  - — Single channel LVDS interface support: 1 x 18-bpp OR 1 x 24-bpp (Type 1 only), compatible with VESA LVDS color mapping)
  - — Dual channel LVDS interface support: 2 x 18-bpp panel support or 2 x 24-bpp panel (Type 1 only)
  - — TFT panel type supported
- Pixel dithering for 18-bit TFT panel to emulate 24-bpp true color displays
- Panel Fitting, Panning, and Center mode supported
- Standard Panel Working Group (SPWG) v.3.5 specification compliant
- Spread spectrum clocking supported
- Panel power sequencing support
- Integrated PWM interface for LCD backlight inverter control

Analog TV-Out

- Three integrated 10-bit DACs
- MacroVision* support
- Overscaling
- NTSC/PAL
- Component, S-Video, TV D connector, and Composite Output Interfaces
- SDTV 480i support†
- EDTV 480p support†

- HDTV 720p, 1080i support†
- True HDTV 1080p support†

† The Mobile Intel GM965 Express chipset supports the equivalent PAL resolutions.

SDVO Ports

- Two SDVO ports supported
  - — SDVO pins are muxed onto the PCI Express Graphics attach port pins
  - — DVI 1.0 support for External Digital Monitor
  - — HDCP 1.2 support
  - — Display Hot Plug support
  - — Second CRT support
- Supports appropriate external SDVO components (HDMI, DVI, LVDS, Analog TVOut, Analog CRT)
- I2C* channel provided for control
- SDTV 480i support†
- EDTV 480p support†
- HDTV 720p, 1080i support†
- True HDTV 1080p support†

† The Mobile Intel GM965 Express chipset support the equivalent PAL resolutions

Direct Management Interface

- Chip-to-chip interface between (G)MCH and Intel® 82801 GBM/GHM
- Configurable as x2 or x4 DMI lanes
- DMI x2 lanes reversed is not supported
- DMI polarity inversion is supported
- 2-GB/s (1 GB/s each direction) point-to-point interface to Intel 82801 GBM/GHM
- 32-bit downstream address
- DMI asynchronously coupled to core
- APIC and MSI interrupt messaging support
- Supports SMI, SCI and SERR error indication
- Legacy support for ISA regime protocol (PHOLD/PHOLDA) required for parallel port DMA, floppy drive, and LPC bus masters

Power Management

- Supports ACPI 3.0
- S States: S0, S3, S4, S5
- C States: C0, C1, C1E, C2, C2E, C3, C4, C4E and Intel® Enhanced Deeper Sleep states
- M States: M0, M1, M-off
- PCI Express Link States: L0, L0s, L1, L2/L3 ready, L3
- H_SLPCPU# output
- H_DPWR# support
- Intel® Rapid Memory Power Management (Intel® RMPM)
- Intel® Dynamic Front Side Bus Frequency Switching
- Graphics Display Adapter States: D0, D3
- Intel® Display Power Saving Technology (Intel DPST) 3.0
- Intel Smart 2D Display Technology (Intel® S2DDT)
- Dynamic Display Power Optimization* (D2PO) Panel Support
- Intel® Automatic Display Brightness
- Intel® Display Refresh Rate Switching

Configuration

You can configure support for the Chipset from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Chipset ACPI Configuration Submenu. Or go to the Chipset Menu->North Bridge Configuration Submenu and Chipset Menu->South Bridge Configuration Submenu.

Super I/O

The Winbond 83627HF Super I/O chip is installed on the ETXexpress Carrier Board, which carries the ETXexpress-MC Module.

The Winbond Super I/O chip supports the following functions:

- Floppy drive
- PS/2 keyboard and PS/2 mouse
- Parallel port
- Serial Ports (2x)

Configuration

You can configure support for the Super I/O from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Super I/O Configuration Submenu.

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6. Primary Connector (Rows A and B)

Connector Rows A and B, the primary ETXexpress connector, provide support for Advanced Configuration and Power Interface (ACPI), Audio (Intel's High definition audio – Azalia, and legacy sound - AC97), Ethernet, Graphics (digital flat panel, analog CRT, and dual displays), Low Pin Count (LPC), which enables legacy devices, Serial ATA for hard drives, and USB 2.0 for I/O peripherals.

For complete information on BIOS setup options (when available), see the BIOS Operation section in the back of this manual.

Advanced Configuration and Power Interface (ACPI)

Advanced Configuration and Power Interface (ACPI) is an open industry specification developed by Microsoft and others that establishes industry-standard interfaces for OS-directed configuration and power management.

Configuration

The BIOS setup utility features ACPI submenus under the Advanced Menu in which to configure the ACPI. The submenus cover:

- ACPI Configuration
- General ACPI Configuration
- Advanced ACPI Configuration
- Chipset ACPI Configuration

You can configure ACPI support from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->ACPI Configuration Submenu

Audio

The ETXexpress-MC offers two audio choices:

- Azalia, Intel's High Definition Audio Specification
- ??? AC97, the legacy audio interface

Azalia

Azalia, Intel's High Definition Audio Specification, describes an architecture and infrastructure to support high quality audio implementations for PCs. The specification defines the register-level interface, physical-link characteristics, and codec-programming model as well as codec-architectural components.

Intel's audio interface supersedes AC97 and achieves a 50 per cent reduction in power for audio processing.

Configuration

You can configure Audio support from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Chipset Menu->South Bridge Chipset Configuration Submenu.

AC97

The AC97 Specification provides low-cost, high-quality sound to board manufacturers. This is done by embedding half of the required technology in the motherboard chipset (South Bridge) and the other half is a separate chip from an OEM supplier. As the solution is fitted/provided in two locations, it sometimes must be disabled in two locations should you add another PCI sound card.

Configuration

The embedded part of the solution (south bridge) provides the Sound output and can be enabled/disabled in the BIOS. An additional chip (such as the AD1881) provides the effects (such as reverb) to the sound signal.

You can configure Audio support from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Chipset Menu->South Bridge Chipset Configuration Submenu.

Ethernet

Integrated LAN capability can be enabled for 10/100/1000 Ethernet LAN and managed 10/100/1000 Ethernet LAN. The options utilize Intel® SingleDriver™ Technology, which is a common set of drivers that simplifies network complexity and increases the ease of deployment.

Configuration

By default, the Ethernet functionality is enabled in BIOS.

To disable Ethernet support, go to the BIOS Setup Utility by pushing the delete button on the keyboard during startup. In the BIOS Setup Utility, choose Chipset->South Bridge Configuration->Pro NIC Controller [Enabled/Disabled].

Graphics

The GMCH (Graphics and Memory Controller Hub) can drive a CRT, flat panel, Analog TV and/or dual display support via two SDVO devices. (SDVO ports are muxed with PCI Express). The display is the defining portion of a graphics controller. The display converts a set of source images or surfaces, combines them, and sends them out at the proper timing to an output interface connected to a display device. Data can be converted from one format to another, stretched, or shrunk, and can be color corrected or gamma converted.

CRT and LVDS Resolutions

- CRT up to 2048 x 1536
- LVDS up to UXGA (1600 x 1200)
- JILI/ EDID support

LCD Panel Support

- Single and Dual Channel LVDS

TV out / HDTV Resolution

- TV output. Component, S-Video or composite
- HDTV Support (480p/720p/1080i/1080p)

Configuration

You can configure graphics support from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Chipset Menu->North Bridge Chipset Configuration Submenu->Video Function Configuration Submenu.

LPC

The Low Pin Count (LPC) Interface Specification for legacy I/O has facilitated the industry's transition toward ISA-less systems. The LPC interface allows legacy I/O motherboard components, typically integrated in a Super I/O chip, to migrate from the ISA/X-bus to the LPC interface while retaining full software compatibility.

The LPC interface offers several key advantages over ISA/X-bus, such as reduced pin count for easier, more cost-effective design. The LPC interface is software-transparent for I/O functions and compatible with existing peripheral devices and applications such as parallel and serial ports, keyboards, and mice.

The LPC Interface Specification describes memory, I/O, and DMA transactions. Unlike ISA, which runs at 8MHz, LPC uses the PCI 33MHz clock and is compatible with more advanced silicon processes. The reduced pin count uses less space and power and is more thermal-efficient.

Configuration

The BIOS automatically configures the settings.

Serial ATA

The ETXexpress-MC provides 3 Serial ATA (SATA) connections and 1 Parallel ATA (PATA) connection. Serial ATA supports all ATA and ATAPI devices.

Serial ATA hard-drive connections boost the data transfer rate up to 150MB per second. In addition, it changes IDE/ATA from a parallel interface requiring 40 separate wires to connect components to a serial interface requiring only 6 wires. The smaller connector allows better cooling and frees up space in a variety of form factors.

Configuration

You can configure Serial ATA support from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->IDE Configuration Submenu. In addition, you also can configure master and slave hard drives in the Primary IDE Master Submenu. Go to the Advanced Menu->Primary IDE Master Submenu.

USB 2.0

The ETXexpress-MC provides support for up to 8 USB 2.0 ports for external peripherals. USB 2.0 is up to 40 times faster than the original USB standard. USB 2.0 is backward compatible with USB 1.1.

Configuration

You can configure support for the USB 2.0 ports from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->USB Configuration Submenu.

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7. Secondary Connector (Rows C and D)

The secondary connector (Rows C and D) provides support for the following buses and I/O:

- PCI Express
- PCI
- IDE

For complete information on BIOS setup options (when available), see the BIOS Operation section in the back of this manual.

PCI Express

The ETXexpress-MC supports PCI Express Cards via 4 PCI Express lanes as well as established hardware solutions based on current buses such as the 32-bit PCI bus.

PCI Express is an I/O interconnect bus standard (which includes a protocol and a layered architecture) that expands on and doubles the data transfer rates of the original PCI specification. PCI Express is a two-way, serial connection that carries data in packets along two pairs of point-to-point data lanes, compared to the single parallel data bus of traditional PCI that routes data at a set rate.

Initial bit rates for PCI Express reach 2.5Gb per second per lane direction, which equate to data transfer rates of approximately 200MB per second. PCI Express was developed so that high-speed interconnects such as Firewire (1394b), USB 2.0, InfiniBand, and Gigabit Ethernet would have an I/O architecture suitable for high-speed transfers.

Configuration

The BIOS automatically configures settings for the PCI Express bus. However, you can configure support for the PCI bus from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->PCI Express Configuration Submenu and/or Chipset Menu->North Bridge Chipset Configuration Submenu.

PCI

Kontron ETXexpress COMs based on the PICMG defined standard for COM Express Type 2 modules will continue to support legacy I/O devices. No PCI Express components such as PCI plug-in cards are supported with the PCI 2.1, 32-bit interface. PCI is a 64-bit bus, though it is usually implemented as a 32-bit bus. It can run at clock speeds of 33MHz or 66MHz. At 32 bits and 33MHz, it yields a throughput rate of 133 megabits per second.

Configuration

The BIOS automatically configures settings for the PCI bus. However, you can configure support for the PCI bus from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the PCI/PNP Menu for PCI BIOS options.

IDE

The ETXexpress-MC provides support for 1 Parallel ATA (PATA) drive. The IDE connector supports up to two IDE devices and supports Ultra DMA 33/66/100 mode with data transfer rates up to 100 megabits per second.

Configuration

You can configure support for the Parallel ATA drive from the BIOS Setup Utility. (Press the Delete button during reboot.) Go to the Advanced Menu->IDE Configuration Submenu and/or Advanced Menu->Primary IDE Master Submenu.

Parallel ATA is available as the Secondary, Third and Fourth IDE Master but never as Primary IDE Master, which is reserved for Serial ATA.

8. Super I/O Subsystems

The Winbond W83627HF chip is located on the ETXexpress Carrier Board, not the ETXexpress-MC Module. The chip provides support for legacy I/O devices such as the floppy drive, IrDA, PS/2 keyboard, PS/2 mouse, parallel port, and 2x serial ports.

Please note that the Winbond W83627HF is an optional baseboard feature; the BIOS installed on the ETXexpress-MC supports it, but if it is not present, or if another SIO is used, then you must install a different BIOS, as appropriate, using a Flash utility.

Floppy Drive

The ETXexpress-MC provides support for a floppy drive.

The floppy-disk interface shares signals with the parallel-communication interface. The floppy interface is limited to one drive (drive_1). A standard floppy cable has two connectors for floppy drives. One connector has a non-twisted cable leading to it; the other has a twisted cable leading to it. When using the floppy interface you must connect the floppy drive to the connector (drive_1) that has the non-twisted cable leading to it.

Configuration

The floppy drive interface uses I/O and IRQ resources. The resources are allocated by the BIOS during POST configuration and are set to be compatible with common PC/AT settings.

You can configure support for the floppy drive from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Floppy Configuration Submenu.

IrDA

The ETXexpress-MC is capable of IrDA SIR operation. This feature is implemented in the Winbond 83627HF. You can use COM2 for IrDA and ASK IR operation.

The Infrared Data Association (IrDA) ensures that the infrared communications between computers, PDAs, printers, digital cameras, and remote controls are compatible with each other, regardless of brand. The term also is used to designate an IrDA-compliant, infrared-communications port on a device.

Configuration

You can configure support for IrDA from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Super I/O Configuration Submenu.

PS/2 Keyboard

The ETXexpress-MC provides support for a PS/2 keyboard.

Configuration

The keyboard uses I/O and IRQ resources. The BIOS allocates the resources during POST configuration. The resources are set to be compatible with common PC/AT settings.

You can configure support for the PS/2 keyboard from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Super I/O Configuration Submenu.

PS/2 Mouse

The ETXexpress-MC provides support for a PS/2 mouse.

Configuration

The mouse uses I/O and IRQ resources. The BIOS allocates the resources during POST configuration. The resources are set to be compatible with common PC/AT settings.

You can configure support for the PS/2 mouse from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Boot Menu Settings Menu or the Boot Settings Configuration Submenu.

Parallel Port

The ETXexpress-MC provides support for one high-speed bi-directional SPP/EPP/ECP parallel port. The parallel-communication interface shares signals with the floppy-disk interface.

Configuration

The parallel-communication interface uses I/O, IRQ, and DMA resources. The resources are allocated by the BIOS during POST configuration and are compatible with common PC/AT settings.

You can configure support for the Parallel Port from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Super I/O Configuration Submenu.

Serial Ports (1 and 2)

The ETXexpress-MC provides support for up to two RS232 serial interfaces (TTL). You can use COM2 for IrDA and ASK IR operation.

Configuration

The serial-communication interface uses I/O and IRQ resources. The resources are allocated by the BIOS during POST configuration and are compatible with common PC/AT settings.

You can configure support for the Serial Ports from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Super I/O Configuration Submenu.

Watchdog Timer

This feature is implemented in the Winbond 83627HF Super I/O. You can configure the Watchdog Timer (WDT) in the BIOS setup to start after a set amount of time after power-on boot. The application software should strobe the WDT to prevent its timeout. Upon timeout, the WDT resets and restarts the system. This provides a way to recover from program crashes or lockups.

Configuration

You can configure support for the Watchdog Timer from the BIOS Setup Utility. (Press the Delete button during reboot to see the BIOS Setup Utility.) Go to the Advanced Menu->Super I/O Configuration Submenu.

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9: System Resources

Interrupt Request (IRQ) Lines

APIC Mode

IRQ #	Used For	Available	Comment
0	Timer0	No	
1	Keyboard	No	
2	Slave 8259	No	
3	COM2	No	Note (1)
4	COM1	No	Note (1)
5	PCI/LPT2	Yes	Note (2)
6	Floppy Drive Controller	No	Note (1)
7	LPT1	No	Note (1)
8	RTC	No	
9	SCI	Yes	System Control Interrupt
10	COM3	Yes	Note (2)
11	COM4	Yes	Note (2)
12	PS/2 Mouse	No	Note (1)
13	FPU	No	
14	IDE0	No	Note (4)
15	IDE1	No	Note (4)
16	PIRQ[A]	For PCI	PCI IRQ line 1 + USB UCHI controller #1 + Graphics controller
17	PIRQ[B]	For PCI	PCI IRQ line 2 + AC97 Audio controller
18	PIRQ[C]	For PCI	PCI IRQ line 3 + USB UCHI controller #3 + Native IDE
19	PIRQ[D]	For PCI	PCI IRQ line 4 + USB UCHI controller #2
20	PIRQ[E]	No	LAN Controller
21	PIRQ[F]	No	
22	PIRQ[G]	No	
23	PIRQ[H]	No	USB EHCI controller

Notes:

1 If the “Used For” device is disabled in setup, the corresponding interrupt is available for other devices.
2 Unavailable if baseboard is equipped with an I/O controller SMC FDC37C669, and the device is enabled in setup.
3 Unavailable in Advanced Configuration and Power Interface (ACPI) mode. Used as System Control Interrupt (SCI) in ACPI mode.
4 IRQs are available if IDE controller is either disabled in setup or if in Native IDE mode.

8259 PIC Mode

IRQ #	Used For	Available	Comment
0	Timer0	No	
1	Keyboard	No	
2	Slave 8259	No	
3	COM2	No	Note (1)
4	COM1	No	Note (1)
5	LPT2	Yes	Note (2)
6	Floppy Drive Controller	No	Note (1)
7	LPT1	No	Note (1)
8	RTC	No	
9	SCI	Yes	Note (3)
10	COM3	Yes	Note (2)
11	COM4	Yes	Note (2)
12	PS/2 Mouse	No	Note (1)
13	FPU	No	
14	IDE0	No	Note (1)
15	IDE1	No	Note (1)

Notes:

1 If the “Used For” device is disabled in setup, the corresponding interrupt is available for other devices.
2 Unavailable if baseboard is equipped with an I/O controller SMC FDC37C669, and the device is enabled in setup.
3 Used as System Control Interrupt (SCI) in ACPI mode. The SCI is a shareable interrupt, so IRQ9 can only be used for the PCI bus. The ISA bus does not support it.
4 IRQs are available if the IDE controller is either disabled in setup or if in Native IDE mode.

Direct Memory Access (DMA) Channels

DMA #	Used for	Available	Comment
0		Yes	
1		Yes	Unavailable if AC97 Sound controller enabled
2	FDC	No	If the "used-for" device is disabled in setup, the corresponding DMA channel is available for other devices.
3	LPT	Yes	Unavailable if LPT is used in ECP mode.
4	Cascade	No	
5		Yes	
6		Yes	
7		Yes	

Memory Area

Upper Memory	Used for	Available	Comment
C0000h – CFFFFh	VGA BIOS	No	
D0000h – DFFFFh		Yes	ISA bus or shadow RAM
E0000h – FFFFFh	System BIOS	No	

I/O Address Map

The I/O-port addresses of the ETXexpress-MC are functionally identical to a standard PC/AT.

The following I/O ports are used:

I/O Address	Used for	Available	Comment
2E8-2Efh	COM4	No	Available if external I/O controller not used.
370-371h	Configuration space for Super I/O controller	No	Available if external I/O controller not used.
3E8-3Efh	COM3	No	Available if external I/O controller not used.
1000h >	PCI	No	I/O ports 1000h and above might be allocated by PCI devices or onboard hardware.

Peripheral Component Interconnect (PCI) Devices

PCI Device	Busmaster	PCI Interrupt	Comment
Audio, USB and Ethernet		See IRQ resource tables above.	Integrated in the Intel chipset. No REQx/GNTx pair needed.

Use REQ0/GNT0, REQ1/GNT1, REQ2/GNT2, and REQ3/GNT3 for external PCI devices.

Inter-IC (I2C) Bus

I2C Address	Used For	Available	Comment
A0h	EEPROM	No	EEPROM for CMOS data.
B0h	Reserved	No	Reserved for internal use.
58h	Reserved	No	Reserved for internal use.

System Management (SM) Bus

You can use the following SM bus addresses for external devices.

SM Bus Address	SM Device	Comment
12h	SMART_CHARGER	Not to be used with any SM bus device except a charger.
14h	SMART_SELECTOR	Not to be used with any SM bus device except a selector.
16h	SMART_BATTERY	Not to be used with any SM bus device except a battery.
D2h	Clock generator	Do not use under any circumstances.

The standard ETXexpress-MC power management BIOS does not support batteries. If you require further information, please contact Kontron Technical Support.

10: BIOS

Introduction

The ETXexpress-MC uses an AMIBIOS, which is located in the Flash memory. The BIOS version displays onscreen during the POST at boot. The device has an 8-bit access. The shadow RAM feature offers faster access (16 bit). You can update the BIOS using a Flash utility. For complete AMIBIOS information, visit the AMIBIOS Web site.

Determining the BIOS Version

To determine the AMIBIOS version, immediately press the **Delete** key on your keyboard as soon as you see the following text display in the upper left corner of your screen:

```
AMBIOS © 2003 American Megatrends
BIOS Date: 03/14/05 17:36:08 Ver. ETX1R003
```

Configuring the System BIOS

The AMIBIOS setup utility allows you to change system behavior by modifying the BIOS configuration. Setup-utility menus allow you to make changes and turn features on or off. AMIBIOS setup menus represent those found in most models of the ETXexpress-MC. The BIOS setup utility for specific models can differ slightly.

Note: Selecting incorrect values can cause system boot failure. Load setup-default values to recover by pressing <F9>.

Starting the Setup Utility

To start the AMIBIOS setup utility, press <**Delete**> when the following string appears during bootup.

```
Press <DEL> to enter Setup
```

The Main Menu then appears.

Several sections comprise the **Setup Screen**.

Setup Screen	Location	Function
Menu Bar	Top	Lists and selects all top level menus, including Main, Advanced, PCI/PNP, Boot, Security, Chipset, Power, and Exit.
Legend Bar	Right	Lists setup navigation keys
Item Specific Help Window	Right	Help for selected item
Menu Window	Top Center	Selection fields for current menu

Menu Bar

The menu bar at the top of the window lists different menus. Use [ENTER], [TAB], OR [SHIFT-TAB] to select a field.

Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The table below describes the legend keys and their alternates.

Key	Function
⇦ or ⇨ Arrow key	Select screen.
⇧ or ⇩ Arrow key	Select item in current menu.
+ -	Change field.
Tab	Select a field.
F1	General Help
F10	Save and Exit.
ESC	Exit

Selecting an Item

Use the ⇧ or ⇩ key to move the cursor to the field you want. Then use the + and - keys to select a value for that field. The **Save Value** commands in the **Exit** menu save the values displayed in all the menus.

Displaying Submenus

Use the ⇦ or ⇨ key to move the cursor to the submenu you want. Then press <Enter>. A pointer (⏵) marks all submenus.

Item Specific Help Window

The Help window on the right side of each menu displays the Help text for the selected item. It updates as you move the cursor to each field.

General Help Window

Pressing <**F1**> on a menu brings up the General Help window that describes the legend keys and their alternates. Press <**Esc**> to exit the General Help window.

General Help	
⇦ or ⇨	Select System
+ -	Change Option/Field
PGDN	Next Page
HOME	Go to Top of Screen
F2/F3	Change Colors
F8	Load Failsafe Defaults
F10	Save and Exit
⇧ or ⇩ Arrow key	Select Item
Enter	Go to subscreen
PGUP	Previous page
END	Go to Bottom of Screen
F7	Discard changes
F9	Load Optimal Defaults
ESC	Exit

Note: In the following tables, **bold** text in the Options column denotes default settings.

Main Menu

Feature	Option	Description
System Time	Enter time.	Set system time.
System Date	Enter date.	Set system date.

Advanced Menu

Feature	Option	Description
▸ CPU Configuration	Submenu	Configure CPU.
▸ IDE Configuration	Submenu	Configure IDE devices.
▸ Floppy Configuration	Submenu	Configure floppy drives.
▸ Super IO Configuration	Submenu	Configure Super IO Win267.
▸ ACPI Configuration	Submenu	Configure ACPI.
▸ Event Log Configuration	Submenu	Clear or view event log statistics.
▸ General Purpose Inputs/Outputs	Submenu	GPIO Configuration
▸ Watchdog	Submenu	Watchdog Timer configuration
▸ Hardware Health Monitor	Submenu	Configure and monitor hardware.
▸ MPS Configuration	Submenu	Configure Multiprocessor table.
▸ PCI Express Configuration	Submenu	Configure PCI Express Support.
▸ Remote Access Configuration	Submenu	Configure remote access.
▸ USB Configuration	Submenu	Configure USB support.

CPU Configuration Menu

Feature	Option	Description
Configure advanced CPU settings		
Intel SpeedStep tech.	Maximum Speed Minimum Speed **Automatic** Disabled	Maximum: CPU speed is set to maximum. Minimum: CPU speed is set to minimum. Automatic: CPU speed controlled by OS. Disabled: Default CPU speed.
Intel C-STATE tech.	**Enabled** Disabled	CState: CPU idle is set to C2 C3 C4

IDE Configuration Menu

Feature	Option	Description
IDE Configuration		
ATA/IDE Configuration	Disabled **Compatible** Enhanced	Configure ATA/IDE hard drives.
Legacy IDE Channels	SATA only **SATA Pri, PATA Sec** PATA only	Choose legacy IDE channel.
▸ Primary IDE Master	Submenu	When entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE devices.
▸ Primary IDE Slave	Submenu	See Primary IDE Master Description.
▸ Secondary IDE Master	Submenu	See Primary IDE Master Description.
▸ Secondary IDE Slave	Submenu	See Primary IDE Master Description.
Hard Disk Write Protect	**Disabled** Enabled	Disable/Enable device write protection. This works only if device is accessed through BIOS.
IDE Detect Timeout (Sec)	0, 5, 10, 15, 20, 25, 30, **35**	Select timeout value for detecting ATA/ATAPI devices.
ATA (PI) 80 Pin Cable Detection	**Host & Device** Host Device	Select mechanism to detect 80 Pin ATA (PI) Cable.
Primary IDE Cable Type	**80 Pin** 40 Pin	Manually select the type of cable used on the Primary IDE.

Floppy Configuration Submenu

Feature	Option	Description
Floppy Configuration		
Floppy A	**Disabled** 360KB 5 ¼” 1.2MB 5 1/4” 720KB 3 1/2” 1.44MB 3.5” 2.88MB 3.5”	Select the type of floppy drive connected to the system.
Floppy B	**Disabled** 360KB 5 ¼” 1.2MB 5 1/4” 720KB 3 1/2” 1.44MB 3.5” 2.88MB 3.5”	Select the type of floppy drive connected to the system.

Super I/O Configuration

Feature	Option	Description
Configure WIN267 Super IO Chipset		
Onboard Floppy Controller	**Enabled** Disabled	Allows BIOS to enable or disable Floppy controller.
Floppy Drive Swap	Enabled **Disabled**	
Serial Port1 Address	Disabled **3F8/IRQ4** 3E8/IRQ4 2E8/IRQ3	Allows BIOS to select Serial Port1 base addresses.
Serial Port2 Address	Disabled **2F8/IRQ4** 3E8/IRQ4 2E8/IRQ3	Allows BIOS to select Serial Port1 base addresses
Serial Port2 Mode	**Normal** IrDA ASK IR	Allows BIOS to select mode for Serial Port2.
Onboard CIR Port	**Disabled** 3E0	Allows BIOS to Enable or Disable CIR port.
Parallel Port Address	Disabled **378** 278 3BC	Allows BIOS to select Parallel Port Base addresses.
Parallel Port Mode	**Normal** Bi-directional ECP EPP ECP & EPP	Allows BIOS to select parallel port mode.
Parallel Port IRQ	IRQ5 **IRQ7**	Allows BIOS to select parallel port IRQ.

ACPI Configuration

Feature	Option	Description
General ACPI Configuration	Submenu	General ACPI configuration settings.
Suspend Mode	**Auto** S1 (POS) S3 (STR)	Select the ACPI state used for system suspends.
Repost Video on S3 Resume	No **Yes**	Determines whether to invoke VGA BIOS post on S3/STR resume.
Advanced ACPI Configuration	Submenu	Use this section to configure additional ACPI options.
ACPI 2.0 Features	**Yes** No	Enable RSDP pointers to64-bit Fixed System Description Tables.
ACPI APIC support	Enabled Disabled	Include ACPI APIC table pointer to RSDT pointer list.
AMI OEMB table	**Enabled** Disabled	Include OEMB table pointer to R (X) SDT pointer lists.
Headless mode	**Disabled** Enabled	Enable / Disable headless operation mode through ACPI.
Chipset ACPI Configuration	Submenu	Chipset ACPI related Configuration settings.
APIC ACPI SCI IRQ	**Disabled** Enabled	Enable / Disable APIC ACPI SCI IRQ.
USB Device Wakeup from S3/S4	**Disabled** Enabled	Enable / Disable USB Device Wakeup from S3/S4.

Event Log Configuration

Feature	Option	Description
View Event Log		View all unread events on the Event log.
Mark all events as read	**OK** Cancel	Mark all unread events as read.
Clear Event Log	**OK** Cancel	Discard all events in the Event Log.

General Purpose Inputs/Outputs

Feature	Option	Description
GPIO 0 Input/Output	**Output** Input	
Output Level	**High** Low	
Blink	**Off** On	
GPIO 1 Input/Output	**Output** Input	
Output Level	**High** Low	
Blink	**Off** On	
GPO 0		
Output Level	**High** or Low	
----------	**Off** or On	
Blink		
GP0 1 Output Level	**High** or Low	
GPI 0 Invert	**Off** On	
GPI 1 Invert	**Off** On	
GPI 2 Invert	**Off** On	

Watchdog Timer

Feature	Option	Description
Mode	Disabled **Reset** NMI	Select watchdog operation mode.
Delay	**Disabled** 1S, 5S, 10S, 30S, 1min, 5min, 10m, 30m	The time until the watchdog counter starts counting.
Timeout	0.4s, 1s, 5s, 10s, **30s**, 1m, 5m, 10m	Useful to handle longer boot times.

Hardware Health Monitor Submenu

This submenu allows you to monitor hardware temperatures and voltages.

Feature	Example Readout
CPU Temp	: 61 C / 141 F
Local Temp 1	: 61 C / 141 F
Local Temp 2	: 61 C / 141 F
Fan 1	: 4500 RPM
0.9V	: 0.91 V
VCORE	: 1.31 V
1.05 V	: 1.06V
1.5 V	:1.50 V
1.8 V	: 1.83 V
2.5 V	: 2.49 V
+12V	: 11.81 V

MPS Configuration

Feature	Option	Description
MPS Revision	1.1 **1.4**	Select MPS Revision.

PCI Express Configuration Submenu

Feature	Option	Description
Active State Power-Management	**Disabled** Enabled	Enable/Disable PCI Express L0s and L1 link power states.

Remote Access Configuration Submenu

Feature	Option	Description
Remote Access	**Disabled** Enabled	Select Remote Access Type

USB Configuration Submenu

Feature	Option	Description
USB Configuration		
USB Function	Disabled 2 USB Ports 4 USB Ports 6 USB Ports **8 USB Ports**	Enables USB host controllers.
Legacy USB Support	Disabled **Enabled** Auto	Enables support for legacy USB. AUTO disables legacy support if no USB devices are connected.
USB 2.0 Controller	**Enabled** Disabled	Enable / Disable USB 2.0 Controller.
USB 2.0 Controller Mode	Full Speed **High Speed**	Configures USB 2.0 controller in HiSpeed (480Mbps) or Full Speed (12Mbps).
BIOS EHCI Hand-off	Disabled **Enabled**	Workaround for OSes without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.
Hotplug USB FDD Support	Disabled Enabled **Auto**	A dummy FDD device is created that will be associated with the hotplugged FDD later. Auto creates this dummy device only if there is no USB FDD present.
USB Mass Storage Device Configuration	Submenu	Configure the USB Mass Storage Class Devices.
USB Mass Storage Reset Delay	10 Sec **20 Sec** 30 Sec 40 Sec	Number of seconds POST waits for the USB mass storage device after start unit command.
Emulation Type	**Auto** Floppy Forced FDD Hard Disk CDROM	If Auto, USB devices less than 530MB will be emulated as Floppy and remain as hard drive. Force FDD option can be used to force a HDD formatted drive (such as a Zip drive) to boot as FDD.

PCI/PNP Menu

Setting the wrong values in these features may cause the system to malfunction.

Feature	Option	Description
Advanced PCI/PnP Settings		
Clear NVRAM	**No** Yes	Clear NVRAM during System Boot.
Plug & Play O/S	**No** Yes	No lets BIOS configure all system devices. Yes lets OS configure PnP device not required for boot, if system uses PnP OS.
PCI Latency Timer	32, **64**, 95, 128, 160, 192, 224, 248	Value in units of PCI clocks for PCI device latency timer register.
Allocate IRQ to PCI VGA	**Yes** No	Yes assigns IRQ to PCI VGA card if card requests IRQ. No does not assign IRQ to PCI VGA card even if card requests an IRQ.
Palette Snooping	**Disabled** Enabled	Enable informs the PCI devices that an ISA graphics device is installed so that the card will function correctly.
PCI IDE BusMaster	**Disabled** Enabled	Enable allows BIOS to use PCI busmastering for reading / writing to IDE drives.
Offboard PCI/ISA Card	**Auto** PCI Slot1 PCI Slot2 PCI Slot3 PCI Slot4 PCI Slot5 PCI Slot6	Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card.
IRQ3	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ4	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ5	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ7	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ9	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.

Feature	Option	Description
IRQ10	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ11	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ14	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
IRQ15	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
DMA Channel 0	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
DMA Channel 1	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
DMA Channel 3	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
DMA Channel 5	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
DMA Channel 6	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for use by legacy ISA devices.
DMA Channel 7	**Available** Reserved	Available: Specified IRQ is available for use by PCI/PnP devices. Reserved: Specified IRQ is reserved for legacy ISA devices.
Reserved Memory Size	**Disabled** 16k 32k 64k	Sets size of memory block to reserve for legacy ISA devices.

Boot Menu

Boot Settings Configuration Menu

Feature	Option	Description
Boot Settings Configuration		
Quick Boot	Enabled **Disabled**	Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
Quiet Boot	Enabled **Disabled**	Disabled displays normal POST messages. Enabled displays OEM Logo instead of POST messages.
AddOn ROM Display Mode	**Force BIOS** Keep Correct	Set display mode for Option ROM.
Bootup Num-Lock	Off **On**	Select Power-on state for Numlock.
PS/2 Mouse Support	Off **On**	Select support for PS/2 mouse.
Wait for 'F1" If Error	**Enabled** Disabled	Wait for F1 key to be pressed if error occurs.
Hit "Del" Message Display	**Enabled** Disabled	Displays "Press DEL to run Setup in POST."
Interrupt 19 Capture	Disabled **Enabled**	Enabled allows option ROMS to trap Interrupt 19.

Boot Device Priority Submenu

Feature	Option	Description
Boot Device Priority		
1st Boot Device	**Available Device** Disabled	Specifies the boot sequence from available devices. A device enclosed in parenthesis has been disabled in the corresponding type menu.

Security Menu

Feature	Option	Description
Security Settings		
Change Supervisor Password	Enter New Password	Install or change password.
Change User Password	Enter New Password	Install or change password.
Boot Sector Virus Protection	**Disabled** Enable	Enable / Disable Boot Sector Virus Protection
Hard Disk Security		
Primary Master HDD User Password	**Disabled** Enabled	Set or clear password for hard disk. Power must be cycled for disk to lock.

Chipset Menu

Feature	Option	Description
Advanced Chipset Settings		
‣ North Bridge Configuration	Submenu	Configure Settings during System Boot.
‣ South Bridge Configuration	Submenu	Specifies the Boot Device Priority sequence.

North Bridge Chipset Configuration Submenu

Feature	Option	Description
North Bridge Chipset Configuration		
DRAM Frequency	**Auto** 400MHz 533MHz	Set DRAM frequency.
Configure DRAM Timing by SPD	**Enabled** Disabled	Configure DRAM timing.
Memory Hole	**Disabled** 15MB-16MB	Enable / Disable memory hole.
Boot Graphics Adapter Priority	IGD PEG/IGD **PEG/PCI** PCI/PEG PCI/IGD	Select which graphics controller to use as the primary boot device. IGD = Integrated Graphics Device. PEG = PCI Express Graphics.
Internal Graphics Mode Select	**Enabled, 32MB** Disabled Enabled, 1MB Enabled, 4MB Enabled, 8MB Enabled, 16MB	Select amount of system memory used by the internal graphics device.
Aperture Size Select	**256MB** 128MB	Select aperture size.
Video Function Configuration		
Boot Display Device	**CRT/LFP** CRT TV DFP CRT/DFP LFP	
Flat Panel Type	**Auto** VGA 640x480 1x18 SVGA 800x600 1x18 XGA 1024x768 1x18 XGA2 1280x1024 2x18 SXGA2 1280x1024 2x18 UXGA 1600x1200 2x18 SXGA 1280x1024 1x18 PAID FPID	
Local Flat Panel Scaling	Centered **Stretched** Disabled	

South Bridge Chipset Configuration Submenu

Feature	Option	Description
South Bridge Chipset Configuration		
Onboard Audio	**Enabled** Disabled	
Gigabit LAN	**Enabled** Disabled	PCI Express Port 1 must be enabled to enable the Gigabit LAN device.
PXE Option ROM	Enabled **Disabled**	Enables boot from LAN via PXE.
Reserved Page Route	**PCI** LPC	Determines Port 80h/84-86h/88h/8C-8Eh Route to LPC or PCI.
SLP_S4# Min. Assertion Width	4-5 seconds 3-4 seconds 2-3 seconds **1-2 seconds**	
Restore on AC Power Loss	Power Off Power On **Last State**	
PCI Express Ports Configuration		
PCI Express Port 1	**Enabled** Disabled	
PCI Express Port 2	**Enabled** Disabled	
PCI Express Port 3	**Enabled** Disabled	
PCI Express Port 4	**Enabled** Disabled	

Power Menu

A power-management system reduces energy used after periods of inactivity.

Feature	Option	Description
Advanced SMI Enable Controls		
Power Management/APM	**Enabled** Disabled	Enable / Disable SMI-based power management and APM support.
Power Savings Under AC	Enabled **Disabled**	Enable / Disable PM when AC powered.
Power Savings Level	**Disabled** Minimum Medium Maximum Customized	Disabled disables all timer-based Power Management. Maximum provides best battery life. Customized allows you to create your own Power Savings Level.
Power Button Mode	**On/Off** Suspend	Select Power Button functionality.
Advanced Resume Event Controls		
USB Controller Resume	**Enabled** Disabled	Enable / Disable USB wake from sleep states.
PME Resume	Enabled **Disabled**	Enable / Disable PME wake from sleep states.
RI Resume	Enabled **Disabled**	Enable / Disable RI wake from sleep states.

Exit Menu

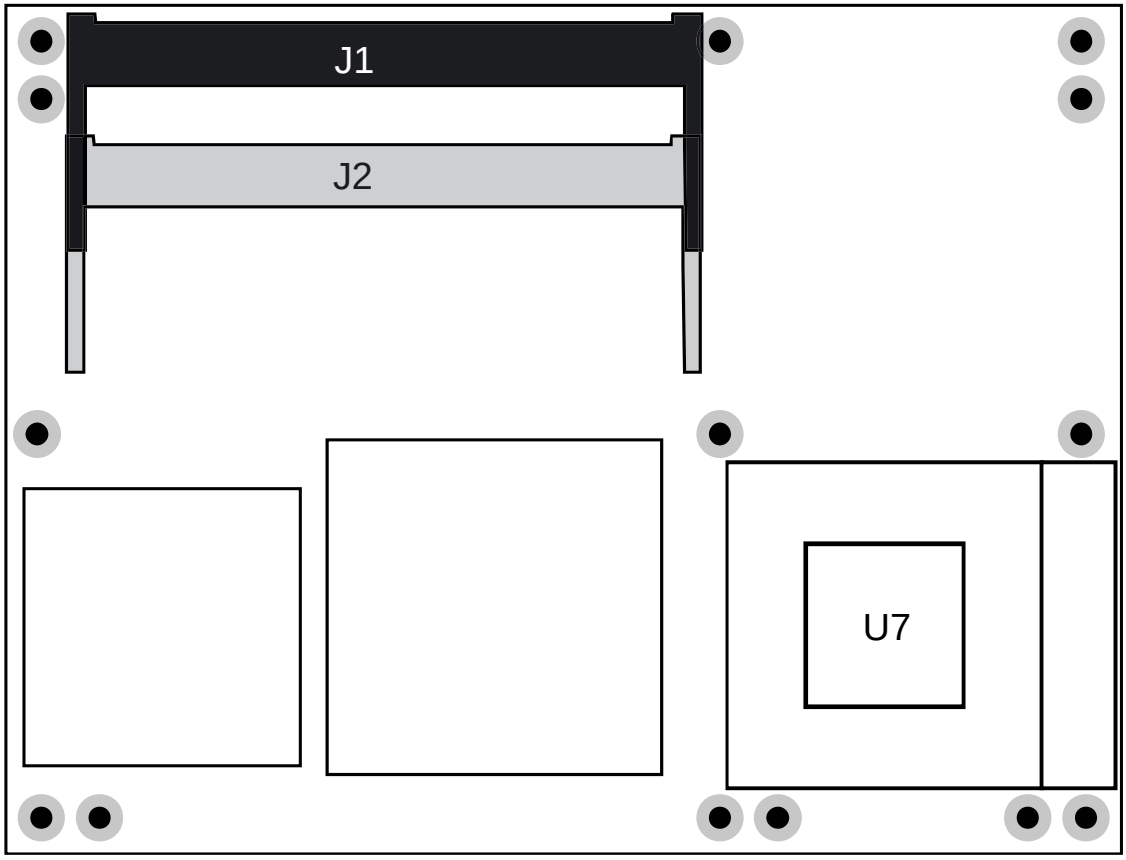
Feature	Option	Description
Exit Options		
Save Changes and Exit	**OK** Cancel	Exit system setup after saving the changes. F10 key can be used for this operation.
Discard Changes and Exit	**OK** Cancel	Exit system setup without saving any changes. ESC key can be used for this operation.
Discard Changes	**OK** Cancel	Discards changes to any setup question. F7 key can be used for this operation.
Load Optimal Defaults	**OK** Cancel	Load Optimal Default values for all setup questions. F9 key can be used for this operation.
Load Failsafe Defaults	**OK** Cancel	Load Failsafe Default values for all setup questions. F8 key can be used for this operation.

11: Connectors and Pinouts

Connectors

Connector Locations (Top)

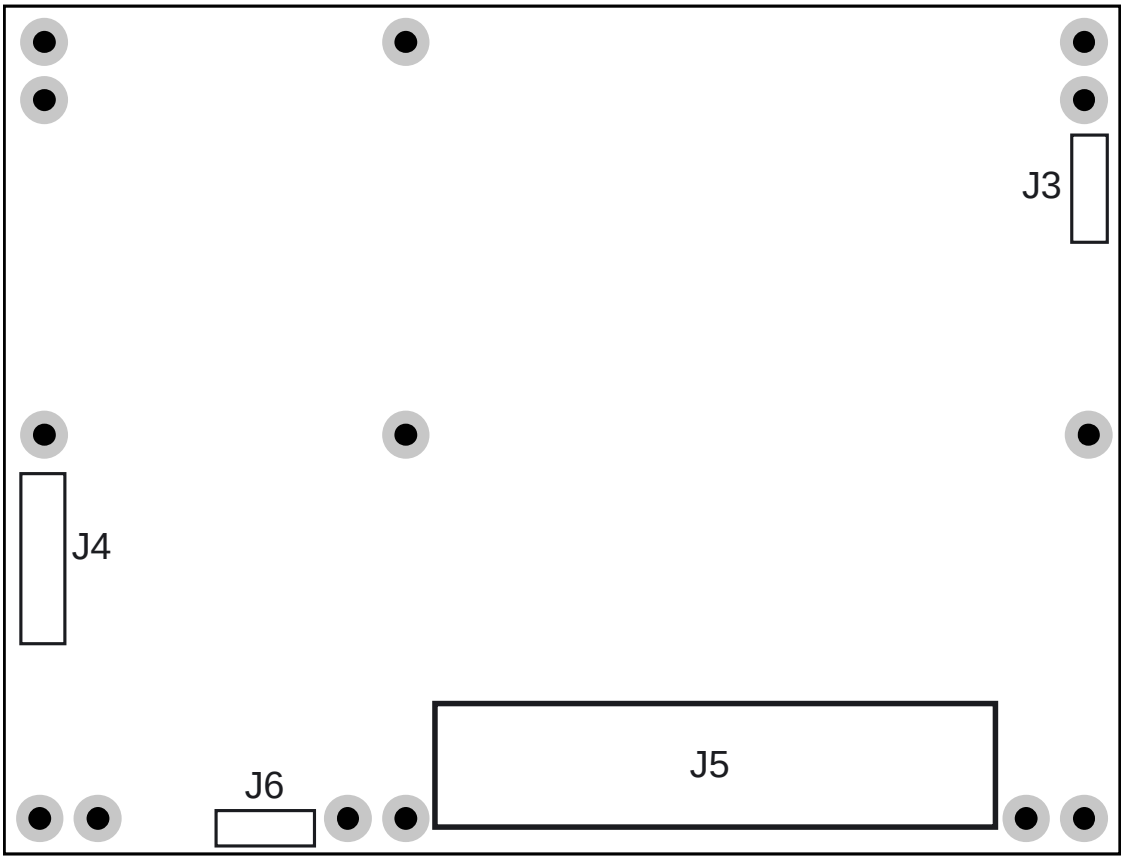
The illustration below shows the location of the major components on the top side of the ETXexpress-MC Module.



Connector	Description
U7	CPU Socket
J1, J2	DDR2-SODIMM Sockets (2x 200pin)

Connector Locations (Bottom)

The illustration below shows the location of the major components on the bottom side of the ETXexpress-MC Module.



Connector	Description
J3	(Reserved for Factory Use Only)
J4	ITP700 Flex Debug Port
J5	ETXexpress Connectors
J6	Fan Connector

Pin-outs

The ETXexpress-MC is a COM Express™ Specification compliant embedded module following the Type 2 pin-out configuration. The pin-outs for the ETXexpress Primary and Secondary Connectors (J5) are documented here for convenient reference. Please see the COM Express™ Specification on the PICMG (PCI Industrial Computer Manufacturers Group) Web site: www.picmg.org for further information, including the four other COM Express pin-out types. (There is a fee for the specification.)

ETX-Express / COM Express Connectors (J5)

Row A		Row B		Row C		Row D	
A1	GND (FIXED)	B1	GND (FIXED)	C1	GND (FIXED)	D1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_LINK_ACT#	C2	IDE_DD[7]	D2	IDE_DD[5]
A3	GBE0_MDI3+	B3	LPC_FRAME#	C3	IDE_DD[6]	D3	IDE_DD[10]
A4	GBE0_LINK100#	B4	LPC_AD[0]	C4	IDE_DD[3]	D4	IDE_DD[11]
A5	GBE0_LINK1000#	B5	LPC_AD[1]	C5	IDE_DD[15]	D5	IDE_DD[12]
A6	GBE0_MDI2-	B6	LPC_AD[2]	C6	IDE_DD[8]	D6	IDE_DD[4]
A7	GBE0_MDI2+	B7	LPC_AD[3]	C7	IDE_DD[9]	D7	IDE_DD[0]
A8	GBE0_LINK_ACT#	B8	LPC_DRQ[0]#	C8	IDE_DD[2]	D8	IDE_DREQ
A9	GBE0_MDI1-	B9	LPC_DRQ[1]#	C9	IDE_DD[13]	D9	IDE_DIOW#
A10	GBE0_MDI1+	B10	LPC_CLK	C10	IDE_DD[1]	D10	IDE_DDACK#
A11	GND (FIXED)	B11	GND (FIXED)	C11	GND (FIXED)	D11	GND (FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#	C12	IDE_DD[14]	D12	IDE_IRQ
A13	GBE0_MDI0+	B13	SMB_CK	C13	IDE_IORDY	D13	IDE_DA0
A14	GBE0_CTREF	B14	SMB_DAT	C14	IDE_DIOR#	D14	IDE_DA1
A15	SUS_S3#	B15	SMB_ALERT#	C15	PCI_PME#	D15	IDE_DA2
A16	SATA0_TX+	B16	SATA1_TX+	C16	PCI_GNT[2]#	D16	IDE_DCS1#
A17	SATA0_TX-	B17	SATA1_TX-	C17	PCI_REQ[2]#	D17	IDE_DCS3#
A18	SUS_S4#	B18	SUS_STAT#	C18	PCI_GNT[1]#	D18	IDE_RESET#
A19	SATA0_RX+	B19	SATA1_RX+	C19	PCI_REQ[1]#	D19	PCI_GNT[3]#
A20	SATA0_RX-	B20	SATA1_RX-	C20	PCI_GNT[0]#	D20	PCI_REQ[3]#
A21	GND (FIXED)	B21	GND (FIXED)	C21	GND (FIXED)	D21	GND (FIXED)
A22	SATA2_TX+	B22	-nu-	C22	PCI_REQ[0]#	D22	PCI_AD[1]
A23	SATA2_TX-	B23	-nu_	C23	PCI_RESET#	D23	PCI_AD[3]
A24	SUS_S5#	B24	ETX_PWR_OK	C24	PCI_AD[0]	D24	PCI_AD[5]
A25	SATA2_RX+	B25	-nu-	C25	PCI_AD[2]	D25	PCI_AD[7]
A26	SATA2_RX-	B26	-nu-	C26	PCI_AD[4]	D26	PCI_CBE[0]#
A27	BATLOW#	B27	WDTOUT	C27	PCI_AD[6]	D27	PCI_AD[9]
A28	ATA_ACT#	B28	AC_SDIN2	C28	PCI_AD[8]	D28	PCI_AD[11]
A29	AC_SYNC	B29	AC_SDIN1	C29	PCI_AD[10]	D29	PCI_AD[13]
A30	AC_RST#	B30	AC_SDIN0	C30	PCI_AD[12]	D30	PCI_AD[15]
A31	GND (FIXED)	B31	GND (FIXED)	C31	GND (FIXED)	D31	GND (FIXED)
A32	AC_BITCLK	B32	SPKR	C32	PCI_AD[14]	D32	PCI_PAR
A33	AC_SDOUT	B33	I2C_CK	C33	PCI_CBE[1]#	D33	PCI_SERR#
A34	BIOS_DISABLE#	B34	I2C_DAT	C34	PCI_PERR#	D34	PCI_STOP#
A35	THRMTRIP#	B35	THRM#	C35	PCI_LOCK#	D35	PCI_TRDY#
A36	USB[6]-	B36	USB[7]-	C36	PCI_DEVSEL#	D36	PCI_FRAME#
A37	USB[6]+	B37	USB[7]+	C37	PCI_IRDY#	D37	PCI_AD[16]
A38	USB_6_7_OC#	B38	USB_4_5_OC#	C38	PCI_CBE[2]#	D38	PCI_AD[18]

Row A		Row B		Row C		Row D	
A39	USB[4]-	B39	USB[5]-	C39	PCI_AD[17]	D39	PCI_AD[20]
A40	USB[4]+	B40	USB[5]+	C40	PCI_AD[19]	D40	PCI_AD[22]
A41	GND (FIXED)	B41	GND (FIXED)	C41	GND (FIXED)	D41	GND (FIXED)
A42	USB[2]-	B42	USB[3]-	C42	PCI_AD[21]	D42	PCI_AD[24]
A43	USB[2]+	B43	USB[3]+	C43	PCI_AD[23]	D43	PCI_AD[26]
A44	USB_2_3_OC#	B44	USB_0_1_OC#	C44	PCI_CBE[3]#	D44	PCI_AD[28]
A45	USB[0]-	B45	USB[1]-	C45	PCI_AD[25]	D45	PCI_AD[30]
A46	USB[0]+	B46	USB[1]+	C46	PCI_AD[27]	D46	PCI_IRQC#
A47	VCC_RTC	B47	EXCD1_PERST#	C47	PCI_AD[29]	D47	PCI_IRQD#
A48	EXCD0_PERST#	B48	EXCD1_CPPE#	C48	PCI_AD[31]	D48	PCI_CLKRUN#
A49	EXCD0_CPPE#	B49	SYS_RESET#	C49	PCI_IRQA#	D49	-nu-
A50	LPC_SERIRQ	B50	CB_RESET#	C50	PCI_IRQB#	D50	PCI_CLK
A51	GND (FIXED)	B51	GND (FIXED)	C51	GND (FIXED)	D51	GND (FIXED)
A52	-nu-	B52	-nu-	C52	PEG_RX[0]	D52	PEG_TX[0]
A53	-nu-	B53	-nu-	C53	PEG_RX[0]#	D53	PEG_TX[0]#
A54	GPI0	B54	GPO1	C54	TYPE0#	D54	PEG_LANE_RV#
A55	PCIE_TX[4]+	B55	PCIE_RX[4]+	C55	PEG_RX[1]	D55	PEG_TX[1]
A56	PCIE_TX[4]-	B56	PCIE_RX[4]-	C56	PEG_RX[1]#	D56	PEG_TX[1]#
A57	GND	B57	GPO2	C57	TYPE1#	D57	TYPE2#
A58	PCIE_TX[3]+	B58	PCIE_RX[3]+	C58	PEG_RX[2]	D58	PEG_TX[2]
A59	PCIE_TX[3]-	B59	PCIE_RX[3]-	C59	PEG_RX[2]#	D59	PEG_TX[2]#
A60	GND (FIXED)	B60	GND (FIXED)	C60	GND (FIXED)	D60	GND (FIXED)
A61	PCIE_TX[2]+	B61	PCIE_RX[2]+	C61	PEG_RX[3]	D61	PEG_TX[3]
A62	PCIE_TX[2]-	B62	PCIE_RX[2]-	C62	PEG_RX[3]#	D62	PEG_TX[3]#
A63	GPI1	B63	GPO3	C63	-nu-	D63	-nu-
A64	PCIE_TX[1]+	B64	PCIE_RX[1]+	C64	-nu-	D64	-nu-
A65	PCIE_TX[1]-	B65	PCIE_RX[1]-	C65	PEG_RX[4]	D65	PEG_TX[4]
A66	GND	B66	WAKE0#	C66	PEG_RX[4]#	D66	PEG_TX[4]#
A67	GPI2	B67	WAKE1#	C67	-nu-	D67	GND
A68	PCIE_TX[0]+	B68	PCIE_RX[0]+	C68	PEG_RX[5]	D68	PEG_TX[5]
A69	PCIE_TX[0]-	B69	PCIE_RX[0]-	C69	PEG_RX[5]#	D69	PEG_TX[5]#
A70	GND (FIXED)	B70	GND (FIXED)	C70	GND (FIXED)	D70	GND (FIXED)
A71	LVDS_A0+	B71	LVDS_B0+	C71	PEG_RX[6]	D71	PEG_TX[6]
A72	LVDS_A0-	B72	LVDS_B0-	C72	PEG_RX[6]#	D72	PEG_TX[6]#
A73	LVDS_A1+	B73	LVDS_B1+	C73	SDVO_DATA	D73	SDVO_CLK
A74	LVDS_A1-	B74	LVDS_B1-	C74	PEG_RX[7]	D74	PEG_TX[7]
A75	LVDS_A2+	B75	LVDS_B2+	C75	PEG_RX[7]#	D75	PEG_TX[7]#
A76	LVDS_A2-	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	-nu-	D77	IDE_CBLID#
A78	LVDS_A3+	B78	LVDS_B3-	C78	PEG_RX[8]	D78	PEG_TX[8]
A79	LVDS_A3-	B79	LVDS_BKLT_EN	C79	PEG_RX[8]#	D79	PEG_TX[8]#
A80	GND (FIXED)	B80	GND (FIXED)	C80	GND (FIXED)	D80	GND (FIXED)
A81	LVDS_A_CK+	B81	LVDS_B_CK+	C81	PEG_RX[9]	D81	PEG_TX[9]
A82	LVDS_A_CK-	B82	LVDS_B_CK-	C82	PEG_RX[9]#	D82	PEG_TX[9]#
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL	C83	-nu-	D83	-nu-
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY	C84	GND	D84	GND
A85	GPI3	B85	VCC_5V_SBY	C85	PEG_RX[10]	D85	PEG_TX[10]
A86	KBD_RST#	B86	VCC_5V_SBY	C86	PEG_RX[10]#	D86	PEG_TX[10]#
A87	KBD_A20GATE	B87	VCC_5V_SBY	C87	GND	D87	GND
A88	PCIE0_CK_REF+	B88	-nu-	C88	PEG_RX[11]	D88	PEG_TX[11]
A89	PCIE0_CK_REF-	B89	VGA_RED	C89	PEG_RX[11]#	D89	PEG_TX[11]#

Row A			Row B			Row C			Row D	
A90	GND (FIXED)		B90	GND (FIXED)		C90	GND (FIXED)		D90	GND (FIXED)
A91	-nu-		B91	VGA_GRN		C91	PEG_RX[12]		D91	PEG_TX[12]
A92	-nu-		B92	VGA_BLU		C92	PEG_RX[12]#		D92	PEG_TX[12]#
A93	GPO0		B93	VGA_HSYNC		C93	GND		D93	GND
A94	-nu-		B94	VGA_VSYNC		C94	PEG_RX[13]		D94	PEG_TX[13]
A95	RSVD_ADD2_DETECT		B95	VGA_I2C_CK		C95	PEG_RX[13]#		D95	PEG_TX[13]#
A96	GND		B96	VGA_I2C_DAT		C96	GND		D96	GND
A97	VCC_12V		B97	TV_DAC_A		C97	BB_BIOS_WP#		D97	PEG_ENABLE#
A98	VCC_12V		B98	TV_DAC_B		C98	PEG_RX[14]		D98	PEG_TX[14]
A99	VCC_12V		B99	TV_DAC_C		C99	PEG_RX#[14]		D99	PEG_TX[14]#
A100	GND (FIXED)		B100	GND (FIXED)		C100	GND (FIXED)		D100	GND (FIXED)
A101	VCC_12V		B101	VCC_12V		C101	PEG_RX[15]		D101	PEG_TX[15]
A102	VCC_12V		B102	VCC_12V		C102	PEG_RX#[15]		D102	PEG_TX[15]#
A103	VCC_12V		B103	VCC_12V		C103	GND		D103	GND
A104	VCC_12V		B104	VCC_12V		C104	VCC_12V		D104	VCC_12V
A105	VCC_12V		B105	VCC_12V		C105	VCC_12V		D105	VCC_12V
A106	VCC_12V		B106	VCC_12V		C106	VCC_12V		D106	VCC_12V
A107	VCC_12V		B107	VCC_12V		C107	VCC_12V		D107	VCC_12V
A108	VCC_12V		B108	VCC_12V		C108	VCC_12V		D108	VCC_12V
A109	VCC_12V		B109	VCC_12V		C109	VCC_12V		D109	VCC_12V
A110	GND (FIXED)		B110	GND (FIXED)		C110	GND (FIXED)		D110	GND (FIXED)

Fan Connector (J6)

Pin	Function
1	Tach
2	V+
3	V-
4	???

Note: To protect external power lines of peripheral devices, make sure that:

a) the wires have the right diameter to withstand the maximum available current

b) the enclosure of the peripheral device fulfills the fire-protection requirements of IEC/EN60950.

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12. Signal Descriptions

The ETXexpress-MC signal descriptions are given in the following tables.

AC97 Audio / High Definition Audio	Pin Type	Pwr Rail / Tolerance	Description
AC_RST#	O CMOS	3.3V / 3.3V Suspend	Reset output to AC97 CODEC, active low.
AC_SYNC	O CMOS	3.3V / 3.3V	48kHz fixed-rate, sample-synchronization signal to the CODEC(s).
AC_CLK	I/O CMOS	3.3V / 3.3V	12.228 MHz serial data clock generated by the external CODEC(s).
AC_SDO	O CMOS	3.3V / 3.3V	Serial TDM data output to the CODEC.
AC_SDIN[0:2]	I CMOS	3.3V / 3.3V Suspend	Serial TDM data inputs from up to 3 CODECs.

Gigabit Ethernet	Pin Type	Pwr Rail / Tolerance	Description
GBE0_MDI[0:3]+ GBE0_MDI[0:3]-	I/O Analog	3.3V max Suspend	Gigabit Ethernet Controller 0: Media Dependent Interface Differential Pairs 0,1,2,3. The MDI can operate in 1000, 100 and 10 Mbit / sec modes. Some pairs are unused in some modes, per the following: 1000BASE-T / 100BASE-TX / 10BASE-T MDI[0]+/- B1_DA+/- TX+/- TX+/- MDI[1]+/- B1_DB+/- RX+/- RX+/- MDI[2]+/- B1_DC+/- MDI[3]+/- B1_DD+/-
GBE0_ACT#	OD CMOS	3.3V / 3.3V Suspend	Gigabit Ethernet Controller 0 activity indicator, active low.
GBE0_LINK#	OD CMOS	3.3V / 3.3V Suspend	Gigabit Ethernet Controller 0 link indicator, active low.
GBE0_LINK100#	OD CMOS	3.3V / 3.3V Suspend	Gigabit Ethernet Controller 0 100 Mbit / sec link indicator, active low.
GBE0_LINK1000#	OD CMOS	3.3V / 3.3V Suspend	Gigabit Ethernet Controller 0 1000 Mbit / sec link indicator, active low.
GBE0_CTREF	REF	GND min 3.3V max	Reference voltage for Carrier Board Ethernet channel 0 magnetics center tap. The reference voltage is determined by the requirements of the module PHY and may be as low as 0V and as high as 3.3V. The reference voltage output **shall** be current limited on the module. In the case in which the reference is shorted to ground, the current **shall** be limited to 250 mA or less.

IDE	Pin Type	Pwr Rail / Tolerance	Description
IDE_D[0:15]	I/O CMOS	3.3V / 5V	Bidirectional data to / from IDE device.
IDE_A[0:2]	O CMOS	3.3V / 3.3V	Address lines to IDE device.
IDE_IOW#	O CMOS	3.3V / 3.3V	I/O write line to IDE device. Data latched on trailing (rising) edge.
IDE_IOR#	O CMOS	3.3V / 3.3V	I/O read line to IDE device.
IDE_REQ	I CMOS	3.3V / 5V	IDE Device DMA Request. It is asserted by the IDE device to request a data transfer.
IDE_ACK#	O CMOS	3.3V / 3.3V	IDE Device DMA Acknowledge.
IDE_CS1#	O CMOS	3.3V / 3.3V	IDE Device Chip Select for 1F0h to 1FFh range.
IDE_CS3#	O CMOS	3.3V / 3.3V	IDE Device Chip Select for 3F0h to 3FFh range.
IDE_IORDY	I CMOS	3.3V / 5V	IDE device I/O ready input. Pulled low by the IDE device to extend the cycle.
IDE_RESET#	O CMOS	3.3V / 3.3V	Reset output to IDE device, active low.
IDE_IRQ	I CMOS	3.3V / 5V	Interrupt request from IDE device.
IDE_CBLID#	I CMOS	3.3V / 5V	Input from off-module hardware indicating the type of IDE cable being used. High indicates a 40-pin cable used for legacy IDE modes. Low indicates that an 80-pin cable with interleaved grounds is used. Such a cable is required for Ultra-DMA 66, 100 and 133 modes.

Serial ATA	Pin Type	Pwr Rail / Tolerance	Description
SATA0_TX+ SATA0_TX-	O SATA	AC coupled on module	Serial ATA or SAS Channel 0 transmit differential pair.
SATA0_RX+ SATA0_RX-	I SATA	AC coupled on module	Serial ATA or SAS Channel 0 receive differential pair.
SATA1_TX+ SATA1_TX-	O SATA	AC coupled on module	Serial ATA or SAS Channel 1 transmit differential pair.
SATA1_RX+ SATA1_RX-	I SATA	AC coupled on module	Serial ATA or SAS Channel 1 receive differential pair.
SATA2_TX+ SATA2_TX-	O SATA	AC coupled on module	Serial ATA or SAS Channel 2 transmit differential pair.
SATA2_RX+ SATA2_RX-	I SATA	AC coupled on module	Serial ATA or SAS Channel 2 receive differential pair.
SATA3_TX+ SATA3_TX-	O SATA	AC coupled on module	Serial ATA or SAS Channel 3 transmit differential pair.
SATA3_RX+ SATA3_RX-	I SATA	AC coupled on module	Serial ATA or SAS Channel 3 receive differential pair.
ATA_ACT#	O CMOS	3.3V / 3.3V	ATA (parallel and serial) or SAS activity indicator, active low.

PCI Express Lanes (General Purpose)	Pin Type	Pwr Rail / Tolerance	Description
PCIE_TX[0:4]+ PCIE_TX[0:4]-	O PCIE	AC coupled on module	PCI Express Differential Transmit Pairs 0 through 4
PCIE_RX[0:4]+ PCIE_RX[0:4]-	I PCIE	AC coupled off module	PCI Express Differential Receive Pairs 0 through 4
PCIE_TX[16:31]+ PCIE_TX[16:31]-	O PCIE	AC coupled on module	PCI Express Differential Transmit Pairs 16 through 31 These are same lines as PEG_TX[0:15]+ and -
PCIE_RX[16:31]+ PCIE_RX[16:31]-	I PCIE	AC coupled off module	PCI Express Differential Receive Pairs 16 through 31 These are the same lines as PEG_RX[0:15]+ and -
PCIE_CLK_REF+ PCIE_CLK_REF-	O CMOS	3.3V / 3.3V	Reference clock output for all PCI Express and PCI Express Graphics lanes.

PCI Express Lanes x16 Graphics	Pin Type	Pwr Rail / Tolerance	
PEG_TX[0:15]+ PEG_TX[0:15]-	O PCIE	AC coupled on module	PCI Express Graphics transmit differential pairs. Some of these are multiplexed with SDVO lines (see SDVO section). These are the same lines as PCIE_TX[16:31]+ and - in module pin-out types 4 and 5.
PEG_RX[0:15]+ PEG_RX[0:15]-	I PCIE	AC coupled off module	PCI Express Graphics receive differential pairs. Some of these are multiplexed with SDVO lines (see SDVO section). These are the same lines as PCIE_RX[16:31]+ and - in module pin-out types 4 and 5.
PEG_LANE_RV#	I CMOS	3.3V / 3.3V	PCI Express Graphics lane reversal input strap. Pull low on the carrier board to reverse lane order. Be aware that the SDVO lines that share this interface do not necessarily reverse order if this strap is low.
PEG_ENABLE#	I CMOS	3.3V / 3.3V	Strap to enable PCI Express x16 external graphics interface. Pull low to disable internal graphics and enable the x16 interface.

ExpressCard Support	Pin Type	Pwr Rail / Tolerance	Description
EXCD[0:1]_CPPE#	I CMOS	3.3V / 3.3V	PCI ExpressCard: PCI Express capable card request, active low, one per card
EXCD[0:1]_PERST#	O CMOS	3.3V / 3.3V	PCI ExpressCard: reset, active low, one per card

PCI Bus	Pin Type	Pwr Rail / Tolerance	Description
PCI_AD[0:31]	I/O CMOS	3.3V / 5V	PCI bus multiplexed address and data lines
PCI_C/BE[0:3]#	I/O CMOS	3.3V / 5V	PCI bus byte enable lines, active low
PCI_DEVSEL#	I/O CMOS	3.3V / 5V	PCI bus Device Select, active low.
PCI_FRAME#	I/O CMOS	3.3V / 5V	PCI bus Frame control line, active low.
PCI_IRDY#	I/O CMOS	3.3V / 5V	PCI bus Initiator Ready control line, active low.
PCI_TRDY#	I/O CMOS	3.3V / 5V	PCI bus Target Ready control line, active low.
PCI_STOP#	I/O CMOS	3.3V / 5V	PCI bus STOP control line, active low, driven by cycle initiator.
PCI_PAR	I/O CMOS	3.3V / 5V	PCI bus parity
PCI_PERR#	I/O CMOS	3.3V / 5V	Parity Error: An external PCI device drives PERR# when it receives data that has a parity error.
PCI_REQ[0:3]#	I CMOS	3.3V / 5V	PCI bus master request input lines, active low.
PCI_GNT[0:3]#	O CMOS	3.3V / 5V	PCI bus master grant output lines, active low.
PCI_RESET#	O CMOS	3.3V / 5V Suspend	PCI Reset output, active low.
PCI_LOCK#	I/O CMOS	3.3V / 5V	PCI Lock control line, active low.
PCI_SERR#	I/O OD CMOS	3.3V / 5V	System Error: SERR# may be pulsed active by any PCI device that detects a system error condition.
PCI_PME#	I CMOS	3.3V / 5V Suspend	PCI Power Management Event: PCI peripherals drive PME# to wake system from low-power states S1–S5.
PCI_CLKRUN#	I/O CMOS	3.3V / 5V	Bidirectional pin used to support PCI clock run protocol for mobile systems.
PCI_IRQ[A:D]#	I CMOS	3.3V / 5V	PCI interrupt request lines.
PCI_CLK	O CMOS	3.3V / 3.3V	PCI 33MHz clock output.
PCI_M66EN	I CMOS	3.3V / 5V	Module input signal indicates whether an off-module PCI device is capable of 66MHz operation. Pulled to GND by Carrier Board device or by Slot Card if the devices are NOT capable of 66 MHz operation. If the module is not capable of supporting 66 MHz PCI operation, this input **may** be a no-connect on the module. If the module is capable of supporting 66 MHz PCI operation, and if this input is held low by the Carrier Board, the module PCI interface **shall** operate at 33 MHz.

USB	Pin Type	Pwr Rail / Tolerance	Description
USB[0:7]+ USB[0:7]-	I/O USB	3.3V / 3.3V Suspend	USB differential pairs, channels 0 through 7
USB_OC0_1#	I CMOS	3.3V / 3.3V Suspend	USB over-current sense, USB channels 0 and 1. A pull-up for this line **shall** be present on the module. An open drain driver from a USB current monitor on the Carrier Board **may** drive this line low. Do not pull this line high on the Carrier Board.
USB_OC2_3#	I CMOS	3.3V / 3.3V Suspend	USB over-current sense, USB channels 2 and 3. A pull-up for this line **shall** be present on the module. An open drain driver from a USB current monitor on the Carrier Board **may** drive this line low. Do not pull this line high on the Carrier Board.
USB_OC4_5#	I CMOS	3.3V / 3.3V Suspend	USB over-current sense, USB channels 4 and 5. A pull-up for this line **shall** be present on the module. An open drain driver from a USB current monitor on the Carrier Board **may** drive this line low. Do not pull this line high on the Carrier Board.
USB_OC6_7#	I CMOS	3.3V / 3.3V Suspend	USB over-current sense, USB channels 6 and 7. A pull-up for this line **shall** be present on the module. An open drain driver from a USB current monitor on the Carrier Board **may** drive this line low. Do not pull this line high on the Carrier Board.

LVDS Flat Panel	Pin Type	Pwr Rail / Tolerance	Description
LVDS_A[0:3]+ LVDS_A[0:3]-	O LVDS		LVDS Channel A differential pairs
LVDS_A_CK+ LVDS_A_CK-	O LVDS		LVDS Channel A differential clock
LVDS_B[0:3]+ LVDS_B[0:3]-	O LVDS		LVDS Channel B differential pairs
LVDS_B_CK+ LVDS_B_CK-	O LVDS		LVDS Channel B differential clock
LVDS_VDD_EN	O CMOS	3.3V / 3.3V	LVDS panel power enable
LVDS_BKLT_EN	O CMOS	3.3V / 3.3V	LVDS panel backlight enable
LVDS_BKLT_CTRL	O CMOS	3.3V / 3.3V	LVDS panel backlight brightness control
LVDS_I2C_CK	O CMOS	3.3V / 3.3V	I^2C clock output for LVDS display use
LVDS_I2C_DAT	I/O OD CMOS	3.3V / 3.3V	I^2C data line for LVDS display use

LPC Interface	Pin Type	Pwr Rail / Tolerance	Description
LPC_AD[0:3]	I/O CMOS	3.3V / 3.3V	LPC multiplexed address, command and data bus
LPC_FRAME#	O CMOS	3.3V / 3.3V	LPC frame indicates the start of an LPC cycle
LPC_DRQ[0:1]#	I CMOS	3.3V / 3.3V	LPC serial DMA request
LPC_SERIRQ	I/O CMOS	3.3V / 3.3V	LPC serial interrupt
LPC_CLK	O CMOS	3.3V / 3.3V	LPC clock output - 33MHz nominal

Analog VGA	Pin Type	Pwr Rail / Tolerance	Description
VGA_RED	O Analog		Red for monitor. Analog DAC output, designed to drive a 37.5-Ohm equivalent load.
VGA_GRN	O Analog		Green for monitor. Analog DAC output, designed to drive a 37.5-Ohm equivalent load.
VGA_BLU	O Analog		Blue for monitor. Analog DAC output, designed to drive a 37.5-Ohm equivalent load.
VGA_HSYNC	O CMOS	3.3V / 3.3V	Horizontal sync output to VGA monitor
VGA_VSYNC	O CMOS	3.3V / 3.3V	Vertical sync output to VGA monitor
VGA_I2C_CK	O CMOS	3.3V / 3.3V	DDC clock line (I2C port dedicated to identify VGA monitor capabilities)
VGA_I2C_DAT	I/O OD CMOS	3.3V / 3.3V	DDC data line.

TV Out	Pin Type	Pwr Rail / Tolerance	Description
TV_DAC_A	O Analog		TVDAC Channel A Output supports the following: Composite video: CVBS Component video: Chrominance (Pb) analog signal S-Video: not used
TV_DAC_B	O Analog		TVDAC Channel B Output supports the following: Composite video: not used Component video: Luminance (Y) analog signal. S-Video: Luminance analog signal.
TV_DAC_C	O Analog		TVDAC Channel C Output supports the following: Composite video: not used Component: Chrominance (Pr) analog signal. S-Video: Chrominance analog signal.

SDVO	Pin Type	Pwr Rail / Tolerance	Description
SDVOB_RED+ SDVOB_RED-	O PCIE	AC coupled on module	Serial Digital Video B red output differential pair Multiplexed with PEG_TX[0]+ and PEG_TX[0]- pair
SDVOB_GRN+ SDVOB_GRN-	O PCIE	AC coupled on module	Serial Digital Video B green output differential pair Multiplexed with PEG_TX[1]+ and PEG_TX[1]-
SDVOB_BLU+ SDVOB_BLU-	O PCIE	AC coupled on module	Serial Digital Video B blue output differential pair Multiplexed with PEG_TX[2]+ and PEG_TX[2]-
SDVOB_CK+ SDVOB_CK-	O PCIE	AC coupled on module	Serial Digital Video B clock output differential pair. Multiplexed with PEG_TX[3]+ and PEG_TX[3]-
SDVOB_INT+ SDVOB_INT-	I PCIE	AC coupled off module	Serial Digital Video B interrupt input differential pair. Multiplexed with PEG_RX[1]+ and PEG_RX[1]-
SDVOC_RED+ SDVOC_RED-	O PCIE	AC coupled on module	Serial Digital Video C red output differential pair. Multiplexed with PEG_TX[4]+ and PEG_TX[4]-
SDVOC_GRN+ SDVOC_GRN-	O PCIE	AC coupled on module	Serial Digital Video C green output differential pair. Multiplexed with PEG_TX[5]+ and PEG_TX[5]-
SDVOC_BLU+ SDVOC_BLU-	O PCIE	AC coupled on module	Serial Digital Video C blue output differential pair. Multiplexed with PEG_TX[6]+ and PEG_TX[6]-
SDVOC_CK+ SDVOC_CK-	O PCIE	AC coupled on module	Serial Digital Video C clock output differential pair. Multiplexed with PEG_TX[7]+ and PEG_TX[7]-
SDVOC_INT+ SDVOC_INT-	I PCIE	AC coupled off module	Serial Digital Video C interrupt input differential pair. Multiplexed with PEG_RX[5]+ and PEG_RX[5]-
SDVO_TVCLKIN+ SDVO_TVCLKIN-	I PCIE	AC coupled off module	Serial Digital Video TVOUT synchronization clock input differential pair. Multiplexed with PEG_RX[0]+ and PEG_RX[0]-
SDVO_FLDSTALL+ SDVO_FLDSTALL-	I PCIE	AC coupled off module	Serial Digital Video Field Stall input differential pair. Multiplexed with PEG_RX[2]+ and PEG_RX[2]-
SDVO_I2C_CK	O CMOS	2.5V / 2.5V	SDVO I^2C clock line - to set up SDVO peripherals.
SDVO_I2C_DAT	I/O OD CMOS	2.5V / 2.5V	SDVO I^2C data line - to set up SDVO peripherals.

Miscellaneous	Pin Type	Pwr Rail / Tolerance	Description
I2C_CK	O CMOS	3.3V / 3.3V	General purpose I^2C port clock output
I2C_DAT	I/O OD CMOS	3.3V / 3.3V	General purpose I^2C port data I/O line
SPKR	O CMOS	3.3V / 3.3V	Output for audio enunciator - the "speaker" in PC-AT systems
BIOS_DISABLE#	I CMOS	3.3V / 3.3V	Module BIOS disable input. Pull low to disable module BIOS. Used to allow off-module BIOS implementations.
WDT	O CMOS	3.3V / 3.3V	Output indicating that a watchdog time-out event has occurred.
KBD_RST#	I CMOS	3.3V / 3.3V	Input to module from (optional) external keyboard controller that can force a reset. Pulled high on the module. This is a legacy artifact of the PC-AT.
KBD_A20GATE	I CMOS	3.3V / 3.3V	Input to module from (optional) external keyboard controller that can be used to control the CPU A20 gate line. The A20GATE restricts the memory access to the bottom megabyte and is a legacy artifact of the PC-AT. Pulled low on the module.

Power and System Management	Pin Type	Pwr Rail / Tolerance	Description
PWRBTN#	I CMOS	3.3V / 3.3V Suspend	Power button to bring system out of S5 (soft off), active on rising edge.
SYS_RESET#	I CMOS	3.3V / 3.3V Suspend	Reset button input. Active low input. System is held in hardware reset while this input is low, and comes out of reset upon release.
CB_RESET#	O CMOS	3.3V / 3.3V Suspend	Reset output from module to Carrier Board. Active low. Issued by module chipset and **may** result from a low SYS_RESET# input, a low PWR_OK input, a VCC_12V power input that falls below the minimum specification, a watchdog timeout, or **may** be initiated by the module software.
PWR_OK	I CMOS	3.3V / 3.3V	Power OK from main power supply. A high value indicates that the power is good.
SUS_STAT#	O CMOS	3.3V / 3.3V Suspend	Indicates imminent suspend operation; used to notify LPC devices.
SUS_S3#	O CMOS	3.3V / 3.3V Suspend	Indicates system is in Suspend to RAM state. Active low output.
SUS_S4#	O CMOS	3.3V / 3.3V Suspend	Indicates system is in Suspend to Disk state. Active low output.
SUS_S5#	O CMOS	3.3V / 3.3V Suspend	Indicates system is in Soft Off state. Also known as "PS_ON" and can be used to control an ATX power supply.
WAKE0#	I CMOS	3.3V / 3.3V Suspend	PCI Express wake up signal.
WAKE1#	I CMOS	3.3V / 3.3V Suspend	General purpose wake up signal. **May** be used to implement wake-up on PS2 keyboard or mouse activity.
BATLOW#	I CMOS	3.3V / 3.3V Suspend	Indicates that external battery is low.
THRM#	I CMOS	3.3V / 3.3V	Input from off-module temp sensor indicating an over-temp situation.
THERMTRIP#	O CMOS	3.3V / 3.3V	Active low output indicating that the CPU has entered thermal shutdown.
SMB_CK	I/O OD CMOS	3.3V / 3.3V Suspend Rail	System Management Bus bidirectional clock line. Power sourced through 5V standby rail and main power rails.
SMB_DAT	I/O OD CMOS	3.3V / 3.3V Suspend Rail	System Management Bus bidirectional data line. Power sourced through 5V standby rail and main power rails.
SMB_ALERT#	I CMOS	3.3V / 3.3V Suspend Rail	System Management Bus Alert – active low input can be used to generate an SMI# (System Management Interrupt) or to wake the system. Power sourced through 5V standby rail and main power rails.

General Purpose I/O	Pin Type	Pwr Rail / Tolerance	Description
GPO[0:3]	O CMOS	3.3V / 3.3V	General purpose output pins. Upon a hardware reset, these outputs **should** be low.
GPI[0:3]	I CMOS	3.3V / 3.3V	General purpose input pins. Pulled high internally on the module.

Module Type Definition	Pin Type	Pwr Rail / Tolerance	Description
TYPE[0:2]#	PDS		The TYPE pins indicate to the Carrier Board the Pin-out Type that is implemented on the module. The pins are tied on the module to either ground (GND) or are no-connects (NC). For Pin-out Type 1, these pins are don't care (X). TYPE2# TYPE1# TYPE0# X X X Pin-out Type 1 NC NC NC Pin-out Type 2 NC NC GND Pin-out Type 3 (no IDE) NC GND NC Pin-out Type 4 (no PCI) NC GND GND Pin-out Type 5 (no IDE, no PCI) The Carrier Board **should** implement combinatorial logic that monitors the module TYPE pins and keeps power off (e.g deactivates the ATX_ON signal for an ATX power supply) if an incompatible module pin-out type is detected. The Carrier Board logic **may** also implement a fault indicator such as an LED.

Power and GND	Pin Type	Pwr Rail / Tolerance	Description
VCC_12V	Power		Primary power input: +12V nominal. See Electrical Specifications section for allowable input range. All available VCC_12V pins on the connector(s) **shall** be used.
VCC_5V_SBY	Power		Standby power input: +5.0V nominal. See Electrical Specifications section for allowable input range. If VCC5_SBY is used, all available VCC_5V_SBY pins on the connector(s) **shall** be used. Only used for standby and suspend functions. **May** be left unconnected if these functions are not used in the system design.
VCC_RTC	Power		Real-time clock circuit-power input. Nominally +3.0V. See Electrical Specifications section for details.
GND	Power		Ground - DC power and signal and AC signal return path. All available GND connector pins **shall** be used and tied to Carrier Board GND plane.

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13: Documents and Standards

The following publications are used in conjunction with this standard. When any of the referenced specifications are superseded by an approved revision, that revision shall apply. All documents may be obtained from their respective organizations.

- Advanced Configuration and Power Interface Specification Revision 2.0c, August 25, 2003 Copyright © 1996-2003 Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, Phoenix Technologies Ltd., Toshiba Corporation. All rights reserved. http://www.acpi.info/

- ANSI/TIA/EIA-644-A-2001: Electrical Characteristics of Low Voltage Differential Signaling (LVDS) Interface Circuits, January 1, 2001. http://www.ansi.org/

- ANSI INCITS 361-2002: AT Attachment with Packet Interface - 6 (ATA/ATAPI-6), November 1, 2002. http://www.ansi.org/

- ANSI INCITS 376-2003: American National Standard for Information Technology – Serial Attached SCSI (SAS), October 30, 2003. http://www.ansi.org/

- ATX12V Power Supply Design Guide, Version 2.2, March 2005, Copyright © 2002-2005 Intel Corporation. Available at www.formfactors.org

- ATX Specification, Version 2.2, Copyright © 2003-2004 Intel Corporation. Available at www.formfactors.org

- Audio Codec ’97 Revision 2.3 Revision 1.0, April 2002 Copyright © 2002 Intel Corporation. All rights reserved. http://www.intel.com/labs/media/audio/

- Display Data Channel Command Interface (DDC/CI) Standard (formerly DDC2Bi) Version 1, August 14, 1998 Copyright © 1998 Video Electronics Standards Association. All rights reserved. http://www.vesa.org/summary/sumddcci.htm

- Express Card Standard Release 1.0, December 2003 Copyright © 2003 PCMCIA. All rights reserved. http://www.expresscard.org/

- IEEE 802.3-2002, IEEE Standard for Information technology, Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.” http://www.ieee.org

- Intel Low Pin Count (LPC) Interface Specification Revision 1.1, August 2002 Copyright © 2002 Intel Corporation. All rights reserved. http://developer.intel.com/design/chipsets/industry/lpc.htm

- IPC-2221 Generic Standard On Printed Circuit Board Design, Revision A, May 2003, IPC, www.ipc.org

- JIDA, Technical Specification Nr. X00391.DOC, Revision 2.7, file name jida.pdf, available from your Kontron FAE.

- JIDA32, Kontron JIDA32 Library API Technical Manual, Revision 1.5, file name jida32.pdf, available from your Kontron FAE.

- JIDA32 BIOS Specification, Technical Specification Nr. X01363.DOC, file name X01363_Jida_BIOS_Spec.pdf, available from your Kontron FAE.

- JILI, Revision 2.0, 07-April-2003 Copyright © 2003 Kontron Embedded Computers AG. http://www.jumptec.de/product/data/jili/Jilim120.pdf

- microATX Motherboard Interface Specification, Version 1.2, Copyright © 2003-2004 Intel Corporation. Available at www.formfactors.org

- Open LVDS Display Interface (Open LDI) Specification, v0.95, May 13, 1999, Copyright © National Semiconductor. http://www.national.com

- PC/104-Plus Specification, Version 2.0, November 2003, Copyright © 1992-2003, PC/104 Embedded Consortium. www.pc104.org

- PCI Express Base Specification Revision 1.1, March 28, 2005, Copyright © 2002-2005 PCI Special Interest Group. All rights reserved. http://www.pcisig.com/

- PCI Express Card Electromechanical Specification Revision 1.1, March 28, 2005, Copyright © 2002-2005 PCI Special Interest Group. All rights reserved. http://www.pcisig.com/

- PCI Local Bus Specification Revision 2.3, March 29, 2002 Copyright © 1992, 1993, 1995, 1998, 2002 PCI Special Interest Group. All rights reserved. http://www.pcisig.com/

- PICMG COM.0 R1.0, "COM Express Module Base Specification", July 10, 2005, www.picmg.org Paper copies are available for purchase at the PICMG web site for $95 for non-PICMG members, $45 for PICMG members. PDF copies are available to PICMG members only and are more expensive ($250 to Executive Members and $500 to Affiliate Members).

- Serial ATA: High Speed Serialized AT Attachment Revision 1.0a January 7, 2003 Copyright © 2000-2003, APT Technologies, Inc., Dell Computer Corporation, Intel Corporation, Maxtor Corporation, Seagate Technology LLC. All rights reserved. http://www.sata-io.org/

- Smart Battery Data Specification Revision 1.1, December 11, 1998. www.sbs-forum.org

- System Management Bus (SM Bus) Specification Version 2.0, August 3, 2000 Copyright © 1994, 1995, 1998, 2000 Duracell, Inc., Energizer Power Systems, Inc., Fujitsu, Ltd., Intel Corporation, Linear Technology Inc., Maxim Integrated Products, Mitsubishi Electric Semiconductor Company, PowerSmart, Inc., Toshiba Battery Co. Ltd., Unitrode Corporation, USAR Systems, Inc. All rights reserved. http://www.smbus.org/

- I2C Bus Specification, Version 2.1, January 2000, Philips Semiconductors, Document order number 9398 393 4001 1. http://www.semiconductors.philips.com

- Universal Serial Bus Specification Revision 2.0, April 27, 2000 Copyright © 2000 Compaq Computer Corporation, Hewlett-Packard Company, Intel Corporation, Lucent Technologies Inc, Microsoft Corporation, NEC Corporation, Koninklijke Philips Electronics N.V. All rights reserved. http://www.usb.org/

- VESA Enhanced EDID Standard, Video Electronics Standards Organization, www.vesa.org

- VESA Enhanced Extended Display Identification Guide, Version 1.0, June 4, 2001, Copyright © 2001 Video Electronics Standards Organization, www.vesa.orgANSI/TIA/EIA-644-A-2001: Electrical Characteristics of Low Voltage Differential Signaling (LVDS) Interface Circuits, January 1, 2001. 2Hhttp://www.ansi.org/

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A: Terms and Definitions

Term	Definition
AC '97	Audio Coder-Decoder 1997 – an Intel-defined format for digital encoding and decoding of audio signals.
ADD2 Card	Advanced Digital Display (2nd Generation) Card – an Intel-defined slot card that fits in a x16 PCI Express graphics slot but is used with SDVO signals rather than PCI Express. SDVO signals are multiplexed with PCI Express graphics on some chipsets and in the COM Express™ Specification. ADD2 cards convert the SDVO data stream to display formats such as TMDS, DVI, LVDS or TV encoded.
ADD2-N ADD2-R	Normal pin-out ADD2 card. Reverse pin-out ADD2 card.
ATX	"Advanced Technology eXtended" – an Intel-defined motherboard form factor.
Base Board	An application-specific PC board that accepts a COM Express™ Module. The base board is alternatively referred to as a Carrier Board.
Basic Form Factor	The 125mm x 95mm module size format defined by the PICMG. This form factor is used in space-constrained systems and typically has a single SO-DIMM memory.
BIOS	Basic Input Output System. This software runs from non-volatile memory on the Module or on the Carrier Board and initializes a system and allocates some resources before the operating system takes over.
Carrier Board	An application-specific PC board that accepts a COM Express™ Module. The Carrier Board is alternatively referred to as a Base Board.
COM Express™	A small form-factor module standard defined by the PICMG for mezzanine-style CPU modules that incorporate a rich set of high-speed serial interfaces such as PCI Express, SATA, USB, GbE, and flat-panel LVDS. The PICMG refers to the standard as both COM.0 and COM Express™.
CRT	Cathode Ray Tube
Device Down Device Up	"Device Down" refers to a target IC "down" on the Carrier Board as opposed to being "up" on a slot card. "Device Up" refers to a target IC "up" on a slot card as opposed to being "down" on the Carrier Board.
DIMM	Dual In-line Memory Module – a memory socket format defined by JEDEC. The format is suitable for desktop and workstation computer systems.
DVI-A DVI-D	Digital Video Interface – Analog format input to digital display Digital Video Interface – Digital format input to digital display
EDID	Extended Display Identification Data – This is a VESA standard for identifying display parameters to the host system by using a dedicated I2C bus.
EMI	Electromagnetic Interference

Term	Definition
ETXexpress™	The original Kontron name for the small form factor module standard that also is known as COM Express™. ETXexpress and COM Express™ are used interchangeably in this document.
Express Card	Small form factor hot-pluggable card for mobile computing. Express Card is the CardBus successor and uses USB or PCI Express x1 as the I/O interface. The Express Card standard is maintained by the PCMCIA consortium.
ExpressModule	A PCI Express based modular form factor card promoted by the PCI-SIG for the server and workstation market.
Extended Form Factor	The 155mm x 110mm module size format defined by the PICMG. This form factor is ordinarily used in systems requiring more memory than what is available on Basic Form Factor designs. An Extended Form Factor module typically accepts two full-size DIMMs.
FAE	Field Application Engineer
FFC	Flat Foil Connector
FPD	Flat Panel Display
FPGA	Field Programmable Gate Array
GbE	Gigabit Ethernet
GND	Ground potential
GPI GPIO GPO	General Purpose Input General Purpose Input Output General Purpose Output
HD Audio	High Definition Audio
Hot Swap Hot Plug	Inserting or removing a device from the system without powering the system down.
IC	Integrated Circuit
I2C	Inter Integrated Circuit – a signaling scheme that uses two wires to allow communication between integrated circuits. This is primarily used to read and load register values.
IDE	Integrated Device Electronics – IDE is synonymous with PATA and is a hard-disk standard that uses a single-ended, parallel bus interconnect.
JEDEC	Industry standards organization (originally, the Joint Electron Device Engineering Council). JEDEC standards cover memory modules, memory sockets, IC packaging, memory chip organizations, and more.
JIDA	Jumptec Intelligent Device Architecture. A set of BIOS extensions defined for Kontron modular computer products.
JILI	Jumptec Intelligent LVDS Interface. Kontron hardware / software standard for interfacing embedded computers to flat-panel displays.
LAN	Local Area Network
LDI	LVDS Display Interface
Legacy Free	A system without a PS2 keyboard / mouse controller. Keyboard and mouse, if used, use USB ports.

Term	Definition
LPC	Low Pin Count interface – an Intel-defined standard for attaching low bandwidth peripherals such as serial ports, keyboard controllers, and Super I/Os to a computer system. As the name implies, few pins are involved, making LPC easy to implement.
LVDS	Low Voltage Differential Signaling. Many modern high-speed interfaces, such as PCI Express and SATA, are LVDS interfaces. However, the term LVDS commonly refers to a serialized, differential interface that is used for flat-panel interfacing. In this document and in the COM Express™ Specification, LVDS refers primarily to the flat-panel interface.
MAC	Media Access Controller – the digital hardware control section of a LAN implementation.
MicroATX	Intel-defined motherboard form factor: 9.6” x 9.6”.
Microstrip	A constant width PCB trace on an outer PCB layer that is a fixed height above a reference plane.
Module	A COM Express™ compliant or compatible CPU mezzanine board.
NC	No Connect
NTSC	National Television Standards Committee – refers to composite analog video encoding scheme used in North America.
PAL	Phase Alternating Line. A composite analog video encoding scheme used in many areas of Europe.
PATA	Parallel AT Attachment device – synonymous with IDE – a hard-disk standard that uses a single-ended parallel bus interconnect.
PC-AT	Personal Computer – Advanced Technology. Trademarked term introduced in the 1980s by IBM to identify the current PC technology.
PCB	Printed Circuit Board
PEG	PCI Express Graphics
PCI	Peripheral Component Interconnect – a parallel bus standard for adding peripheral components to a computer system.
PCI Express™	
PCIe™	A high-speed, serialized, peer-to-peer bus standard for adding peripheral components to a computer system. PCI Express (PCIe) is electrically quite different from PCI, but PCI Express software protocols are backward compatible with PCI.
PCI-SIG	PCI Special Interest Group – a standards organization that maintains the PCI™ and PCI Express™ specifications.
PHY	Physical Layer interface of a LAN implementation. The PHY drives physical media such as the twisted pair cable.
Plane split	A cut in a power or ground plane to isolate two regions of the plane from each other. A power plane often has several regions, including 3.3V, 2.5V, and 1.5V.
PLD	Programmable Logic Device
PICMG	PCI Industrial Computer Manufacturing Group – a non-profit industry trade group that issues and maintains technical standards of interest to manufacturers of embedded and industrial computer boards and systems.

Term	Definition
RJ45	Registered Jack 45 – an 8-pin jack used for 10/100 and GbE LAN connections.
PLL	Phase Locked Loop
RGB	Red Green Blue – color components in a VGA or TFT flat-panel display.
RSVD	Reserved. Pins marked RSVD should be left as no-connects.
SATA	Serial AT Attachment device – a high-speed, serial-interconnect standard for hard disks. SATA is electrically quite different from PATA or IDE, but SATA software protocols are backward compatible with PATA.
SDVO	Serialized Digital Video Out. An Intel-defined format for bringing serialized digital video out on a high speed differential interface. SDVO signals are electrically compatible with PCI Express and are multiplexed with PCI Express x16 graphics signals on current Intel chipsets such as the 915G and the 945G. SDVO signals are routed to third party encoder chips from vendors such as Silicon Image.
Smart Battery	A standard describing a uniform software and hardware interface between a host computer system and a battery subsystem (the “Smart Battery”) including charger electronics. Communication is over the SM Bus.
SM Bus	System Management (SM) Bus. A two wire bidirectional bus (clock and serial data) used for system management such as reading parameters from a memory card, and reading temperatures and voltages of system components. The SM Bus uses the same signaling scheme as an I2C bus.
SO-DIMM	Small Outline Dual In-line Memory Module – a memory socket format defined by JEDEC. The format is suitable for small form factor mobile computer systems.
STN	Super Twisted Nematic – a passive, flat-panel display technology that yields very low power consumption displays. TFT displays are usually crisper and brighter than STN, but some situations call for the lower power consumption that STN can offer. STN displays are usually lower resolution (up to 640 x 480) monochrome displays.
Stripline	A constant width internal layer PCB trace that is sandwiched between two reference planes. If the stripline trace is equidistant between the two reference planes, it is said to be symmetric or balanced. If the stripline trace is closer to on of the planes, it is said to be asymmetric or unbalanced.
Super I/O	An integrated circuit that combines common PC I/O functions such as serial ports, floppy disk controllers, parallel ports, and PS2 keyboard and mouse. The Super I/O system interface is typically thru the LPC (Low Pin Count) bus. PCI-based Super I/Os also are available.
TFT	Thin Film Transistor – a reference to a type of flat-panel display with an active transistor at each pixel.

Term	Definition
TMDS	Transition Minimized Differential Signaling – a low voltage differential signaling scheme for flat-panel displays that is an alternative to flat-panel LVDS. TMDS uses 8b/10b encoding to achieve DC balance and is used for DVD-D displays.
U.L.	Underwriter's Laboratories – an industry trade group concerned with safety issues.
USB	Universal Serial Bus – a general purpose, hot-pluggable serial I/O interconnect standard.
VGA	Video Graphics Array
VESA	Video Electronics Standards Association – an industry trade group that issues standards relating to CRT and flat-panel displays.

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B: Troubleshooting

This chapter provides basic troubleshooting information. If you need assistance, please call Customer Service.

Troubleshooting

General Guidelines

The components of a computer are all interrelated. That is, a “video” problem may be caused by the disk controller. The simplest diagnostic technique involves replacing the suspect card with a new one. If that doesn’t fix the problem, remove all cards except for the minimum required by the system. Then run the system, replacing each card until the problem shows itself.

WARNING

The following procedures may involve working with high voltage, which could injure you. Avoid shorting the circuits as this can damage the computer.

CAUTION

The following procedures involve working with a device that is sensitive to static electricity. Use proper precautions to protect against electrostatic discharge (ESD). Only qualified personnel should attempt these procedures.

Unit doesn't power up when switched on

a) Check the front panel switch.

b) Check that the power cord is completely plugged in and power is available at the source.

c) Check if the power supply cables in the chassis have been crimped or pinched. In the case of a short, the power supply will sense the short and shut off. It will also automatically sense the removal of the short and restore operation.

System gains power, but computer doesn't run. No disk activity or beeps.

a) Check the speaker connection.

b) Remove all cards except video card. Turn on system, watch for picture, and listen for beeps. If there is no activity, remove video card, turn on system, and listen for beeps. If there are no beeps, replace CPU or test it in another chassis. If you hear beeps, replace video card.

c) If picture comes up, replace each card one at a time. Faulty card will prevent system from booting.

System beeps but no picture

a) Be sure monitor power is connected and monitor is properly connected to the computer.

b) Check switches on video card. If correct, replace video card.

c) Strip the system down by removing cards until the defective card is identified.

Hard disk drive controller failure on bootup

a) If you are using an IDE hard drive to boot, ensure that the power connector and the ribbon cable are properly connected.

b) Check that the drive is configured properly as master or slave by jumpers on the drive.

c) Check that the HDD parameters are set up correctly in the CMOS Setup. (You can use auto-detect hard disk to set the correct HDD parameters.)

Non Plug-and-Play ISA card is not functioning properly

a) If this card uses an IRQ, make sure that the particular IRQ is reserved to the 'ISA' bus in PCI/PnP setup in CMOS.

When booting, the CPU reports No ROM BASIC

a) The system cannot find a proper bootable sector on either drive A or C. You need to install an operating system on the hard drive or insert a bootable diskette in the A drive.

When booting, the system gives eight beeps

a) These beeps indicate a video adapter problem. Try the video card in a different slot.

b) Try a different video card.

c) If the problem persists, clear CMOS and re-flash the BIOS as described in the motherboard user's manual.

When booting the system, you hear two beeps

a) Two beeps signify a memory error. Re-seat the DIMMs into the DIMM sockets and reboot.

b) If the problem persists, swap DIMMs from one memory bank to the other. If the problem goes away after the swap, then switch the memory back to the original installation and see if the original error occurs.

c) If the problem continues to persist, replace the modules with your spare memory modules.

d) If the problem still persists after installing new memory, then the ATX motherboard may have faulty DIMM sockets and may need to be returned for repair.

The system runs very slowly

The system will run significantly slower if the cache memory has been disabled in the Advanced Setup in CMOS. (Cache memory is automatically disabled when you choose the Fail-Safe option in CMOS setup.)

Troubleshooting Procedures

The following table provides troubleshooting procedures for some common problems. For problems not addressed in the table, use the following guidelines.

- Computer components are all interrelated. That is, a “video” problem may be caused by the disk controller. The simplest diagnostic technique involves replacing the suspect component with a new one.
- Was the system working prior to a change? The change may need a different configuration or may be faulty.
- Check for loose connections in drive cables, power cables to fans, and disk-drive cables.
- Occasionally, Flash BIOS can be corrupted by hardware or software. Check the Kontron Web site for the latest version of BIOS and follow the steps for reflashing.
- When upgrading or adding hardware to an existing system, note board positions and cables. Putting hardware in different slots and making connections in a different order can change the functionality of a system.
- Confirm jumpers and switch settings for all boards in the system are correct. Verify with the individual product manuals the functions and settings of all switches.

If these quick and simple steps fail to resolve the problem, contact Kontron Technical Support for further advanced troubleshooting or reference the “Support” pages of the Kontron Web site.

Common Problems

Symptom	Probable Cause	Recommended Solution
Why does my computer fail to turn on?	DC converter is not plugged into a reliable power supply or not connected securely to the computer's DC-In port.	Ensure the converter is plugged into an electrical outlet (and surge protector if present) and into the DC-In port of computer. Often power cords can become inadvertently disconnected.
	Surge protector is not turned on and/or plugged in.	If you are using a surge protector, ensure the surge protector is turned on and plugged in to the electrical outlet.
	Power supply cabling is shorted to the computer.	Ensure the power supply cabling is not shorted to the computer. Reposition the power supply cables to the computer chassis so they are not pinched or crimped. (In case of a short, the power supply will sense the short and shut off. When the short is removed, the power supply should automatically sense the removal of the short and restore operation. If cables become damaged, contact Kontron for repair or replacement
System is not booting, just beeping.	Memory is not seated correctly or is faulty.	1 beep, 2 beeps, or 3 beeps: Re-seat the memory first. If that does not fix the problem, replace the memory with known good chips.
	BIOS is corrupt.	If your system still fails to boot after reseating the memory and checking cables and boards, try reflashing the BIOS with the latest version, if possible.
When attempting to boot the system, "No ROM BASIC" is displayed.	System cannot find a proper bootable sector on the boot device.	Install an operating system on the hard drive or boot from a floppy disk.
Hard disk drive controller failure	Ribbon cable or power connector not installed correctly	Confirm correct cabling to the hard-drive ribbon cable and power connectors.
	Master/Slave jumpers not configured on hard drives.	Configure the "Master/Slave" jumpers on the hard drives. When sharing a single IDE channel, one drive must be Master and the second drive must be configured as Slave.
	Hard drive parameters in BIOS are incorrect.	Confirm hard-drive parameters in the BIOS setup are correct. Auto-detect the drives and confirm detected parameters are correct for the hard drives.
	Hard drive not seen in FDISK	Verify that the hard drive is seen in FDISK and run FDISK/mbr from boot floppy.

Document Revision History

Revision	Date	Edited by	Changes
1.0	13.06.07	RAH	??? Initial release.